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Fertility Determinants in Cuba

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Panel on Fertility Determinants
Committee on Population and Demography
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PREFACE

Fertility and its determinants have been urgent topics for research in recent decades with the rapid expansion in world population. Attempts to control population growth have focused on reducing fertility, with some apparent effect. The peak rate of growth in the world's population has now been passed, but growth is still at a high level in almost all the developing countries. In absolute numbers, the increase in the world's population continues to rise; according to United Nations medium projections, more people will be added each year for the next 50 years than were added in 1980.

This report is one of a series of country studies of fertility determinants carried out by the Panel on Fertility Determinants of the Committee on Population and Demography. The Committee on Population and Demography was established in April 1977 by the National Research Council in response to a request by the Agency for International Development (AID) of the U.S. Department of State.

The causes of the reductions in fertility--whether they are the effect primarily of such general changes as lowered infant mortality, increasing education, urban rather than rural residence, and improving status of women, or of such particular changes as spreading knowledge of and access to efficient methods of contraception or abortion--are strongly debated. There are also divergent views of the appropriate national and international policies on population in the face of these changing trends. The differences in opinion extend to different beliefs and assertions about what the population trends really are in many of the less-developed countries. Because births and deaths are recorded very incompletely in much of Africa, Asia, and Latin America, levels and trends of fertility and mortality must be estimated, and disagreement has arisen in some instances about the most reliable estimates of those levels and trends.

It was to examine these questions that the committee was established within the Commission on Behavioral and Social Sciences and Education of the National Research Council. It was funded for a period of five and one-half years by AID under Contract No. AID/pha-C-1161 and Grant No. AID/DSPE-G-0061. Chaired by Ansley J. Coale, the committee has undertaken three major tasks:

1. To evaluate available evidence and prepare estimates of levels and trends of fertility and mortality in selected developing nations;
2. To improve the technologies for estimating fertility and mortality when only incomplete or inadequate data exist (including techniques of data collection);
3. To evaluate the factors determining the changes in birth rates in less-developed nations.

Given the magnitude of these tasks, the committee concentrated its initial efforts on the first two tasks. This work is detailed in a series of country and methodological reports from the National Academy Press, and the demographic estimation methodology developed for the country studies is laid out in a volume issued by the United Nations. Altogether, some 170 population specialists, including 94 from developing countries, have been involved in the work of the committee as members of panels or working groups. The committee, the commission, and the National Research Council are grateful for the unpaid time and effort these experts have been willing to give.

The committee initiated work on the third task in October 1979 when the separately funded Panel on Fertility Determinants was established. Research on the determinants of fertility change has been carried out by scholars from several disciplines, and there is no comprehensive accepted theory of fertility change to guide the evaluation. Because of this state of knowledge of the causes of reductions in fertility and the difficulty of the task, the Panel on Fertility Determinants includes scholars from anthropology, demography, economics, epidemiology, psychology, sociology, and statistics. Three committee members serve on the panel. The work program of the panel includes the preparation of a report that attempts to summarize and integrate scientific knowledge about the determinants of fertility (Academic Press, 1983) as well as a few illustrative cross-national analyses and studies of several developing countries (see inside back cover).

This report is the fifth panel country study. It has been prepared by panel member Paula E. Hollerbach, of the Center for Policy Studies of the Population Council, and Sergio Diaz-Briquets, who was with the Population Reference Bureau when the study was prepared and is currently with BD International. Kenneth H. Hill of the committee staff prepared the technical appendix on demographic estimates.

Much of the work on this study was carried out at the Population Council and at the Population Reference Bureau. The authors spent time at each other's institution and at the panel office. Both of the authors' institutions provided logistical support during the initial preparation of the study, and the Population Council assisted with the preparation of study materials, including computer tabulations and graphs, throughout the study. More importantly, each institution essentially supported each author during the time she and he devoted to the preparation of the report. The panel and the committee are grateful to those institutions for their generous support.

The authors and the panel wish to thank Francisco Rojas Ochoa, Director General of the Cuban Instituto de Desarrollo de la Salud, and Mari S. Simonen, evaluation officer of the Policy and Evaluation Division of the United Nations Fund for Population Activities, for their generous provision of material relating to Cuba demography. In addition, several individuals provided information, data, and suggestions for the study: John Bongaarts, Geoffrey McNicoll, Carmelo Mesa-Lago, Lisandro Perez, Jorge Perez-Lopez, Constantina Safilios-Rothschild, and Ferhunde Ozbay. On staff at the Population Council, Joan Elliott and Robert Sendek prepared the graphics for the study, and Adrienne Lindgren efficently and painstakingly typed the successive versions of the manuscript. Finally, panel and committee reviewers provided advice and suggestions.

An early version of the draft report was discussed at a country studies workshop organized by the panel in January 1982 with financial assistance from the Rockefeller Foundation. The Foundation also supported the costs of printing this report.

Several members of the panel staff assisted in the preparation of this report. Rona Biere edited the report, Elaine McGarraugh applied her eagle eye and production editing talents, and Solveig Padilla assisted with the typing.

W. Parker Mauldin, Chair
Panel on Fertility Determinants

SUMMARY

Cuba, the largest archipelago in the Antilles, was discovered in 1492 by Columbus and was conquered and colonized by 1510 with the founding of towns by Diego Velazquez. After centuries of very slow growth, the population increased more rapidly by the end of the eighteenth and into the nineteenth centuries, primarily because of the expanding sugar and coffee economies, which promoted the importation of slaves and the arrival of free migrants. The birth rate in the nineteenth century is thought to have been around 40 per 1,000, while the death rate was high and fluctuating as a result of recurring epidemic diseases. Most of the population growth from 572,000 in 1817 to 1.6 million in 1899 was due to the immigration of Spaniards and other Europeans and the importation of African slaves and Chinese indentured servants.

The course of the demographic transition in twentieth-century Cuba contrasts sharply with the rapid population growth experienced by other developing countries in the post-World War II period. Cuba, along with Uruguay and Argentina, was among the first Latin American nations to experience a transition to low mortality and fertility. Although reliable statistics for earlier time periods are lacking, the available evidence suggests that mortality began to decline at the beginning of this century and fertility during the 1920s, with the latter declining at a relatively rapid rate during the late 1940s and more gradually in the 1950s. By 1958, the birth rate had declined to 26 and the total fertility rate to 3.6-3.8. Fertility had reached moderate levels in most of the provinces, particularly in the central ones, while remaining high in the lower-income and more rural provinces at the extreme eastern and western ends of the island. A

variety of socioeconomic factors may account for this relatively low fertility. Prerevolutionary Cuba was a highly urbanized, secularized country with a high proportion of European-origin inhabitants, high literacy, well-developed communication and transportation systems, and predominantly large-scale plantation farming that employed seasonal labor. Although organized family planning programs and modern contraceptive methods were unavailable, reliance on traditional methods of contraception (condom, withdrawal, rhythm, and douche) also helped to achieve the comparatively low fertility; moreover, while illegal in theory, abortions were openly performed by physicians, as well as by less-skilled and lower-cost practitioners, and were available throughout the country, especially in Havana.

Infant mortality began to decrease even before the reductions in fertility occurred; it fell more sharply after 1925, just after fertility began to decline, and by the early 1950s had dropped to 60. Prior to the revolution, Cuba's medical system was highly developed through mutualist insurance plans and a fairly extensive system of public hospitals and dispensaries, accounting in part for the low infant mortality and high life expectancy achieved by the population.

Thus by 1958, the year prior to the Cuban revolution, Cuba's demographic profile was one of the developing world's most advanced. There was a postrevolutionary baby boom (1959-64) during which the crude birth rate rose from 28 per 1,000 population to 35. Thereafter, fertility declined slowly until 1973, when the crude birth rate finally reached its prerevolutionary level. Trends in fertility from 1973 to 1981 were particularly striking: the crude birth rate declined from 25 in 1973 to 14 in 1981, giving Cuba the lowest birth rate in Latin America. Further examination of trends in total fertility in the immediate pre- and postrevolutionary period shows that the total fertility rate increased from 3.8 in the late 1950s to 4.7 in 1960-65, and subsequently declined in the latter 1960s to 4.3. By 1970-75, the total fertility rate had finally fallen below prerevolutionary levels (3.5 according to Cuban figures), and by 1981 had reached 1.6, well below replacement level.

Estimates suggest that the postrevolutionary baby boom occurred among all age groups, but resulted primarily from a shift toward earlier childbearing and higher fertility among younger women, especially those aged 15-19 and 20-24. The subsequent decline in the late

1960s can be attributed primarily to lower marital fertility, mainly among women age 25 and above. By 1979, all age groups had experienced fertility declines, with 20-29 as the primary reproductive period.

Concurrent with fertility decline, emigration from Cuba over the past 22 years has further reduced population growth rates. Cuba's postrevolutionary baby boom was partially offset by emigration, which reached an early peak between 1960 and 1962 and was interrupted in late 1962 by the missile crisis. A subsequent wave of emigration from late 1965 to 1972 resulted from an agreement between the U.S. and Cuban governments. The latest surge of emigration occurred in 1980 with the Mariel small-boat evacuation.

Figures on Cuban emigration differ somewhat depending on the source. Between January 1, 1959, and September 20, 1980, nearly 800,000 Cubans are known to have entered the United States; this represents 8 percent of the country's population in 1981 (approximately 9.7 million). Estimates of the Cuban-born population and their descendants residing in the United States, based on U.S. census data, indicate that about 700,000 Cubans and their descendants were living in the United States by the late 1970s. Official Cuban figures on net international migration show a net loss (emigrants minus immigrants) of 599,012 persons between 1959 and 1979. It could be hypothesized that the fertility rise in the 1960s would have been even more pronounced in the absence of sex-imbalanced emigration, since the imbalance was concentrated in the peak years of family formation. However, while the data available to test this proposition are extremely limited, they do not suggest that the absence of emigration would have significantly changed the sex ratios of the population of childbearing age.

Data on the expected number of children gathered in the 1979 National Demographic Survey reflect Cuba's recent fertility decline and indicate a continuation of low fertility, at least for the immediate future. Among women aged 15-19 in union, the mean expected family size was only 1.5 children; among those aged 20-24, the expected family size was about 2 children. In comparison, the total fertility rate at that time was 1.8. Among women in union aged 40-44, who were completing their childbearing, the mean number of children was considerably higher--approximately 3.8.

A contraction in rural-urban, provincial, and socioeconomic differentials accompanied the rapid fertility decline. Between 1965 and 1977, declines were particularly sharp in rural areas, and by 1977, rural-urban differentials in fertility had been considerably reduced (TFR of 2.1 in urban and 2.7 in rural areas). In Oriente and Pinar del Rio, characterized by a higher proportion of rural population, the decline in total fertility was steady and uninterrupted. In the other provinces, all of which were more urbanized and of lower fertility, some stabilization and slight increases in fertility were recorded in the early 1970s, with fertility descending again in 1973. By 1977, the largest provincial differentials in total fertility had been considerably reduced (2.6 in Oriente and 1.9 in La Habana). By 1980, fertility differentials by province had contracted even further. Similarly, the decline in total fertility rates occurred within all occupational categories, though it was especially sharp among agricultural workers. By the late 1970s, there was comparatively little difference in fertility by occupational category, with the exception of agricultural laborers, particularly those whose wives had fewer than 3 years of education. With respect to educational differentials, from 1965 to 1977, the sharpest reductions in fertility occurred among women with less than primary-school education, especially among those with fewer than 3 years of schooling completed. Among better-educated women, fertility increased somewhat during the early 1970s and then continued to decline after 1972. By 1977, women with lower-intermediate, upper-intermediate, and university educations had achieved below-replacement-level fertility.

Decomposition of the crude birth rate and general fertility rate for the 1970-79 period indicates that most of the fertility decline during the decade resulted from lower marital fertility due to increased use of fertility regulation, with a less significant contribution from a decline in the proportion of women in reproductive unions. Counteracting these tendencies to a small degree was an increase in the number of women of reproductive age, due to the arrival at these ages of the cohorts born during the early years of the 1960s baby boom.

A variety of factors have been suggested as influencing Cuba's fertility over the past two decades. The available evidence suggests that the baby boom, occurring primarily in the more urbanized provinces, coincided with other changes: government policies pertaining to housing costs, minimum salaries, and the expansion of social services, especially in rural health and education, sharply reduced the cost of living and contributed to a redistribution of personal income benefiting the poor and middle classes; there was a rise in marriage rates and in the proportion of women in union; and abortion and contraception were less available because of more rigorous enforcement of the anti-abortion law and a shortage of contraceptive supplies following the economic blockade of Cuba.

Identifying the socioeconomic determinants of the ensuing fertility decline, beginning in 1965 and especially rapid since 1973, is more problematic. A variety of contributing factors can be identified: declining infant and child mortality; a reduction in the economic value of children in the poorer rural provinces through policies achieving nearly full male employment, universal social security and pension provisions, compulsory primary school education, and age restrictions on the employable population; a rise in the educational attainment of women through the expansion of primary- and secondary-school enrollments and adult education programs; the changing status of women and increasing female labor force participation; recent price increases for services and the high prices charged in parallel and black markets, in conjunction with stabilization and probable reversals in income differentials; the Cuban housing shortage, especially acute in urban areas; a recent rise in the age at marriage; the widespread availability of abortion since the mid-1960s; and the diffusion of modern contraceptives, especially since the mid-1970s.

Because socioeconomic changes since the revolution have been concomitant with accelerated fertility decline, it is extremely difficult to discern which factors are most significant. In the present study, it was found that among the proximate determinants of fertility, decomposed for the 1970-73 period, the effect of contraception is the most significant, followed by the effect of nuptiality; the fertility-inhibiting effects of these two factors are significantly greater than the effect of abortion. Postpartum infecundability is least significant, and is therefore excluded from the discussion that follows. The sections below examine the primary proximate determinants of Cuba's fertility decline--contraception, nuptiality, and abortion--and then focus on the socioeconomic determinants.

CONTRACEPTION

Contraception was not emphasized by the Cuban government until the mid-1970s because of the priority assigned to other needs within the health system. Moreover, although modern contraceptive methods, especially intrauterine devices and sterilization, were available in Cuba during the early 1960s, their quantities were somewhat limited. Contraception was provided in public health facilities on request or upon recommendation by a physician following abortion.

No contraceptive prevalence surveys are available at the national level, and the actual mix of methods is not known. However, contraception is the major method of fertility regulation in Cuba, and all methods are currently available. Early fertility surveys conducted in selected urban and rural areas of Cuba during 1970-73 show that the highest levels of past use were recorded for the intrauterine device and the condom, with sterilization most frequently used by women age 35 and above. In the early 1970s, approximately 35 percent of all women of reproductive age in the rural area surveyed and 54 to 64 percent in urban areas reported that they were currently using some method of contraception. Considerably smaller proportions of women (25-34 percent in the urban areas and 22 percent in the rural areas) were currently using an effective method (intrauterine device, sterilization, diaphragm, or pill). At the national level, it is estimated that 53 percent of all married women of reproductive age were using contraception in 1972.

Since the mid-1970s, the provision of contraceptive services has been facilitated by the assistance of various international agencies, including the United Nations Fund for Population Activities and the International Planned Parenthood Federation. These agencies have provided equipment for obstetrical/gynecological procedures and pregnancy termination, contraceptive supplies, and training fellowships. Presentations and discussions concerning pregnancy, sexuality, breastfeeding, nutrition, pre- and postpartum care, and family planning are provided at meetings of the Committees for the Defense of the Revolution and the Federation of Cuban Women. Some information is also provided by the press, radio, and television, and through sex education in the national school system. However, the major source of information is the classes in family planning, preparation for childbirth, and infant care conducted in polyclinics and maternity homes.

A more recent fertility survey conducted in 1980 in Havana indicates that substantially higher proportions of women in union were then using contraception. Among these women, 68 percent were current users, while 60 percent were using the three most effective methods--intrauterine device, sterilization, and, to a lesser extent, the pill. At the national level, it is estimated that 79 percent of all married women of reproductive age were using contraception in 1980.

On the basis of these limited data, it appears that Cuba's relatively low prerevolutionary birth rate was achieved through use of less effective contraceptive methods and abortion. In the immediate postrevolutionary period, a decline in the prevalence and practice of both was partially responsible for the upturn in the birth rate, followed by a return to the previous pattern by the early 1970s. By 1980, the increased availability of government-supplied contraceptives (primarily the pill, the intrauterine device, and sterilization) had resulted in reduced reliance on less effective methods, higher contraceptive prevalence, and greater access to contraceptive services, especially in the less developed provinces, as well as a decline in the incidence of abortion.

NUPTIALITY

From 1953 to 1970, trends in marital status for Cuban males and females aged 15-49 show a decline in the proportions single and an increase in the proportions in union. During this period, especially the immediate postrevolutionary years 1960-63, both the singulate mean age at marriage and the mean age at legal marriage declined and total marriage rates rose. To illustrate, between 1953 and 1970, the singulate mean age at marriage declined approximately 2.5 years for both males and females. By 1970, the singulate mean age at marriage was 23.4 years for males and 19.5 years for females. By 1971, the last year of published data, the mean age at legal marriage was 26.1 years for women and 30.3 years for men. By 1970, 56 percent of all men and 68 percent of all women of reproductive age were in union, in comparison to 50 percent of all men and 62 percent of all women of reproductive age in 1953. These trends toward earlier marriage seem attributable to the redistribution of income; a reduction in the cost of living, especially in health, education, and housing; and increased economic security due to higher employment rates.

Between 1970 and 1979, however, a trend toward postponement of union was evident. The mean age at marriage for males increased .5 years from 23.4 to 23.9, and for females .7 years from 19.5 to 20.2. Differences in the mean age at marriage for men and women narrowed slightly. Although the number of men and women entering reproductive age increased with the aging of the baby boom cohort, the proportion of the population aged 15-49 currently in union declined somewhat to 65 percent of women and 56 percent of men in 1979. The trend toward postponement of marriage in the late 1970s and an increase in the proportion of single women among those aged 15-19 is probably partially attributable to the expansion of secondary education, the housing shortage in urban areas, and the effect of a marriage squeeze, that is, a shortage of males aged 20-24 for females aged 15-19 (due to the aging of the baby boom cohort and the effect of Cuban military and civilian activities abroad). The impact of this marriage squeeze on nuptiality and fertility was further intensified by the 1980 Mariel sealift, during which 125,000 Cubans, predominantly males, emigrated. These shifts in marriage patterns underlie the decline in age-specific fertility recorded among women aged 15-19 and 20-24 during the latter part of the decade.

Government campaigns have been undertaken to encourage the legalization of consensual unions. Although the proportion of women living in consensual union has decreased somewhat in all age groups, 21 percent of women of reproductive age reported living in consensual union in 1979, in comparison to 25 percent in 1970. The prevalence of consensual union is higher in rural than in urban areas; as in other Latin American countries, women in these unions are less educated and begin their unions at younger ages than women in legal unions. They also have higher fertility and fertility expectations than women in legal unions. However, these fertility differentials are greatest among those with the least education (incomplete primary); within other educational categories, fertility differentials by marital status are negligible.

INDUCED ABORTION

Prior to 1959, abortion in Cuba was highly restricted legally, prohibited except on grounds of grave danger to the woman's life or health, on juridical grounds, or on eugenic grounds. However, the conditions constituting high risk to a woman's health were not defined by the law, but merely required the concurrence of two physicians. Abortion was thus available, especially in Havana, where physicians charged moderate fees according to the social class of their patients. From 1959 to 1964, however, the anti-abortion law was more vigorously enforced. Contraceptive practice in Cuba during this period lagged behind that in some other Latin American nations, and a shortage of contraceptive supplies also developed following the economic blockade of Cuba. As a result, the incidence of illegal abortion increased, and between 1962 and 1965, clandestine abortion accounted for nearly one-third of all maternal deaths.

In late 1964, the Social Defense Code was amended to make the conditions for abortion more flexible by adopting the World Health Organization definition of health--a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity. These criteria have resulted in greater access to abortion. Under the new penal code of November 1, 1979, punishment has been established for illegal abortions, that is, those performed without the permission of the woman, for profit, outside hospitals, or against the regulations established by the Ministry of Public Health. Increasing access to legal abortion has sharply reduced the incidence of illegal abortions, and has also reduced the number of deaths and death rates associated with abortion. In turn, the reduction in the incidence of illegal procedures has been accompanied by an increase in the incidence of legal abortion.

It is probable that in the early period following abortion liberalization, abortion was used primarily by higher-parity women to prevent unwanted births. Educational efforts were originally directed at high-parity women, and in 1968, only 10 percent of all known pregnancies (excluding spontaneous and illegal induced abortions) were terminated through legal abortion. The legal abortion rate per 1,000 women aged 15-44 rose from 17 in 1968 to 70 in 1974; expressed as a total abortion rate (the average number of abortions per woman during her lifetime at prevailing incidence levels), there was an increase from .5 abortions per woman in 1968 to 2.1 abortions in 1974. In the early 1970s, the rise in the legal abortion rate was probably associated with increased availability of abortion services and a relaxation of use or method failure associated with traditional contraceptive methods. After 1974, largely because of the greater availability of effective contraceptives, the abortion rate declined to an estimated 47 in 1980, or 1.4 abortions per woman. However, the abortion ratio showed substantial and consistent annual increases throughout the decade as fertility dropped precipitously: from 103 in 1968, the ratio rose to 432 per 1,000 pregnancies in 1979; by 1979, 40 percent of all known pregnancies were terminated by abortion. This increase may be attributable to current low fertility desires and reliance on abortion in preference to contraception or in situations of contraceptive failure.

SOCIOECONOMIC DETERMINANTS OF FERTILITY

The factors influencing Cuba's fertility decline are difficult to disentangle. Although empirical data on various government policies and socioeconomic determinants are abundant, direct evidence linking these variables and fertility is generally quite limited, and inferences must be drawn from the available data. Some judgments can be made, however, on those factors which seem to be most important.

The decline in infant mortality, especially rapid since 1972, appears to be especially significant. This decline is traceable not only to a reduction in mortality from acute diarrheal and infectious and parasitic disease, but also to the national plan for maternal-infant care initiated in 1969. Under this plan, government targets for infant and child mortality reduction have been largely met; substantial progress has also been made in efforts to reduce maternal mortality. On the programmatic level, the number of physicians, specialists, and facilities has been increased to ensure better coverage for prenatal, infant, and pediatric care, especially in the less developed regions.

Although Cuban fertility had already begun to decline in the early 1920s, earlier than in most of Latin America, it is doubtful that the recent rapid decline in Cuban fertility, especially among less-educated and rural women, could have occurred without the establishment of rural health services to compensate for the previous concentration of services within urban areas, especially Havana. Other components of the maternal-infant care program include early pregnancy detection and monitoring high-risk pregnancies; hospital deliveries of nearly all births; neonatal services to treat newborns with low birthweights and various pathologies; the expansion of pre- and postpartum maternal and infant care through polyclinics; and improvements in rural sanitation.

As a result, since 1969, infant mortality has declined from 47 deaths per 1,000 live births to a provisional official rate of 18.5 in 1981, the lowest infant mortality rate in Latin America. Estimates calculated for the present study, based on analysis of the 1979 National Demographic Survey, do not corroborate the rapid decline in infant mortality since the mid-1970s; however, on grounds of statistical consistency, the decline should be accepted as probably correct. Infant mortality rates have declined in all regions and provinces in the country. Moreover, by 1980, differentials among provinces had been considerably narrowed: infant mortality rates in that year varied from a low of 14 in Matanzas to a high of 24 in Guantanamo province; these narrowed differentials reflect the same distribution as that previously discussed for fertility differentials. In turn, efforts to reduce mortality have lowered fertility: medical personnel have discouraged high-risk pregnancies and births among older women, while individuals have perceptions of higher child survival that reduce the demand for greater numbers of children as "insurance" against child mortality. Given Cuba's current low level of infant mortality, especially in the rural areas, fear of infant and child mortality should no longer influence fertility decisions.

In addition to these efforts promoting improved health care, policies ensuring economic security have probably reduced the economic value of children as sources of labor and old age security, especially in the less developed rural provinces such as Oriente and Pinar del Rio. These policies include nearly full male employment, age restrictions on employment, wage indexing and unemployment insurance, universal social security and pension benefits, the provision of basic needs through the rationing of food and clothing, and free health care and compulsory primary-school education. Data on fertility and the occupational status of the head of household show a sharp reduction in fertility differentials over time between 1964-66 and

1976-78, with the sharpest fertility decline among agricultural workers.

At the same time, other economic policies have contributed to fertility decline by increasing the economic pressures on families. Wage and pricing policies of the 1970s, designed to raise labor productivity, have increased the cost of living over levels of the 1960s. Basic food and clothing needs are met through the rationing system and state-subsidized prices for necessities sold in stores; however, since the early 1970s, the government has begun to charge for utilities and services formerly provided free and has set high prices for scarce consumer goods in the parallel markets established in 1973. These policies, in conjunction with stabilization and probable reversals in income differentials since 1973, have reduced levels of real income over levels of the 1960s for those earning less than average wages. These economic factors seem implicated in fertility decline, although the available empirical data to confirm the association are extremely limited.

Further, improvements in educational attainment have been achieved through compulsory primary-school education for children aged 6-12; expanded secondary-school enrollments, assisted by government grants, which have benefited younger cohorts of women; and adult educational programs for the attainment of primary- and secondary-school education. By 1979, the government goal of 6 years of primary schooling as a national norm had not yet been attained. However, from 1965 to 1977, the sharpest reduction in fertility occurred among women with less than primary-school education, especially among those with less than 3 years of schooling completed. Among better-educated women, fertility increased somewhat during the early 1970s and then continued to decline. After 1972, fertility declined more sharply among these women, and by 1977, those with lower-intermediate, upper-intermediate, and university educations had achieved below-replacement-level fertility.

Another factor contributing to Cuba's fertility decline is government efforts to increase the economic participation of women through adult education, political mobilization and volunteer work, and, more recently during the 1970s, higher rates of female labor force participation. These efforts have provided alternative nonfamilial roles for women and increased the opportunity costs of childbearing. However, despite recent efforts to improve the availability of child care, female employment still entails considerable time constraints on domestic activities, as evidenced by various Cuban time-budget surveys. The available data suggest that the majority of new entrants into the labor force between 1970 and 1979, primarily women in union, began employment following the peak years of childbearing, but it is not known whether there are fertility differentials between employed and nonemployed women. The impact on fertility of other government policies designed to promote egalitarian attitudes through statutory changes is simply unknown.

A final factor associated with fertility decline, especially in urban areas, is a housing shortage. Limited government investment in housing construction has exacerbated this longstanding problem. Because of government investments in health, education, and the economic infrastructure, little housing was constructed between 1959 and 1971. Although emigration has eased the housing shortage and construction has accelerated since 1972, accumulated housing needs have still not been met, especially given the population growth spurt of the early 1960s and deterioration of the current housing stock. The estimated deficit as of the late 1970s was approximately 1.5 million units, and about 22 percent of the Cuban population is classified as living in substandard housing. The shortage appears particularly significant for the baby boom cohort, which is now entering the age of household formation. Data available to examine the impact of the housing shortage on postponement of marriage and the delay or limitation of childbearing are limited to a few small-scale surveys of residents of Havana. However, the rise in marriage rates during periods of heavy emigration suggests that the scarcity of housing delays the age at marriage or limits family size, at least in urban areas, until times when the existing housing stock can be redistributed. The interruption of the fertility decline in the early 1970s, which occurred almost exclusively in the urban areas, may also be associated with the redistribution of housing during this period of emigration.

The combined influence of these societal and programmatic factors on recent declines in Cuban fertility and mortality is particularly marked. In general, factors associated with social change have resulted in lower mortality and reduced economic utility of children and therefore in reduced fertility desires. Although Cuban fertility would undoubtedly have continued to decline even in the absence of programmatic factors, the sharp decline in fertility among less educated and rural women probably could not have been achieved without government efforts to improve the availability of fertility regulation and reduce infant mortality. Unique features of the Cuban context, such as its strong national health policy, resources devoted to the expansion of physician-oriented health care, employment and pricing policies, and the urban housing shortage, serve to distinguish Cuba from other developing nations. Thus, Cuba has achieved below-replacement-level fertility in part through a combination of factors unique among developing nations.

CHAPTER 1

INTRODUCTION

BACKGROUND

The Republic of Cuba, the largest archipelago in the Antilles, consists of the island of Cuba and several hundred small islands and keys, the largest being Isla de la Juventud. At nearly 111,000 square kilometers, Cuba is the largest Caribbean country; it is also the most populous, with approximately 9.7 million people in 1981.

Discovered by Columbus in 1492, Cuba was conquered and colonized at the end of 1510 with the founding of towns by Diego Velazquez. After centuries of very slow population growth, the pace of population increase quickened by the end of the eighteenth century and throughout the first three-quarters of the nineteenth century as the expanding sugar and coffee economies promoted the importation of African slaves and the arrival of free migrants. Despite very high mortality, population growth during this period was rapid, with the population doubling every 30 years or so (see Table 1). By 1730, about 100,000 people lived in Cuba, a figure close to the number of original inhabitants at the time of discovery (Centro de Estudios Demograficos, 1976); by 1841, slightly over a century later, Cuba's population exceeded one million. The birth rate in the nineteenth century is thought to have been around 40 per 1,000, while the death rate was high and fluctuating as a result of frequent epidemic diseases.

In 1898, Cuba was the last American nation, along with Puerto Rico, to sever colonial ties with Spain after three decades of periodic warfare against colonial rule. Following the Spanish-American War and a U.S. occupation of just over 3 years, the new republic was declared officially independent in 1902, although under the economic and political tutelage of the United States.

TABLE 1 Colonial Population Growth, 1774-1899: Cuba

Census Year	Enumerated Population	Annual Intercensal Growth Rate
1774	171,620	--
1792	272,300	2.6
1817	572,363	3.0
1827	704,487	2.1
1841	1,007,624	2.5
1861	1,396,530	1.6
1877	1,509,291	.5
1887	1,631,687	.8
1899	1,572,797	-.3

Source: Cuban historical censuses. See also Comite Estatal de Estadisticas (1980).

The following decades of close and often turbulent U.S.-Cuban relations laid the groundwork for the conflicts that have existed between the two countries since January 1, 1959, when Fulgencio Batista's dictatorship ended and the revolutionary movement led by Fidel Castro assumed power in what was to become the first socialist nation in the Western Hemisphere.

Along with, and partly as a result of, this new political and economic order, Cuba has experienced some notable demographic changes during the past two decades. At the same time, its demographic transition has continued. Cuba, along with Uruguay and Argentina, was among the first of the Latin American nations to experience a sustained transition to low mortality and fertility: mortality began to decline at the beginning of this century and fertility during the 1920s. The crude birth rate, which remained at more than 40 per 1,000 throughout the early part of this century, fell steadily after the 1920s, with a relatively rapid decline during the late 1940s and a more gradual fall in the 1950s; by 1958, it had reached 26 per 1,000. Infant mortality, which had begun to decrease even before this drop in fertility, declined more sharply after 1925, just after the fertility decline began, and by the early 1950s had fallen to 60.

Since 1959, a postrevolutionary baby boom, peaking in 1963-64, has been followed by a slow, persistent decline in fertility from 1965 to 1972 and dramatic declines in national crude birth rates from 1973 to 1981: the general fertility rate declined from 163 births per 1,000 women aged 15-44 in 1965 to 60 births in 1981, giving Cuba the lowest birth rate in Latin America; the crude birth rate in 1965 (34) declined 59 percent to an extremely low rate of 14 births by 1981. A narrowing of provincial, rural-urban, and socioeconomic differentials in fertility accompanied this decline. Trends in postrevolutionary mortality show a continuous increase in life expectancy, largely attributable to reductions in infant mortality, especially neonatal and postneonatal. According to official figures, after a period during which infant mortality showed little general trend in the late 1960s (39.7 per 1,000 live births in 1965, 38.8 in 1970); the 1970s saw a period of sharp decline with a 1981 provisional figure of 18.5 deaths. Survey evidence, while supporting official infant mortality figures for the 1960s and early 1970s, fails to confirm the rapid decline in the late 1970s. The 1979 Cuban National Demographic Survey suggests an infant mortality rate around 35 for 1976-77, which, if correct, indicates a substantial underreporting of infant deaths in the official figures for recent years. However, in the absence of internal evidence to suggest a marked worsening of infant death registration in the late 1970s, we prefer to accept the official figures over the indirect estimates from the 1979 survey.

The Cuban mortality figures, based on death registration data, suggest that by the late 1970s, Cuba had attained the lowest infant mortality rate and highest life expectancy at birth among all Latin American countries, followed closely by Uruguay, Costa Rica, Jamaica, and Panama. The latest declines in fertility in conjunction with the stabilizing of mortality levels at a low of 5.6-5.8 deaths per 1,000 resulted in declining crude rates of natural increase from 19.4 in 1973 to 8.4 by 1980.

PURPOSE OF THIS STUDY

Cuba's declining growth rate contrasts sharply with the rapid population growth experienced by other developing nations in the post-World War II period as a result of declining mortality and high fertility. The course of

Cuba's postrevolutionary demographic change may well be an outcome of its distinctive demographic history, as well as its equally distinctive contemporary government policies. Studying Cuba's population is therefore significant, not so much because of its size, but because of these distinctive historical and political elements. Disentangling the fertility effects of various antecedents is a difficult task; however, the Cuban case, one of particular demographic interest, seems comparatively well documented. This study focuses on Cuba's postrevolutionary fertility trends, attempting to trace some of their determinants and possible consequences. Trends in mortality and immigration are also briefly discussed, especially as they affect fertility.

STRUCTURE OF THIS STUDY

This study first reviews Cuba's prerevolutionary demographic trends (Chapter 2). This is followed by a discussion of postrevolutionary trends--general, age-specific, provincial, and rural-urban--concluding with an examination of fertility desires that provides insight on future trends. Chapter 3 enumerates the proximate determinants of fertility in Cuba. First it examines several topics related to nuptiality: trends in age at marriage and marital status; the effects of cohort size, emigration, and civilian and military overseas activities; and decomposition of the change in birth rates, 1970-79. Next it reviews breastfeeding patterns. Finally, it focuses on fertility regulation: governmental policies; contraceptive prevalence; and access to abortion in connection with declines in fertility and abortion-related mortality. The chapter ends with a decomposition of the proximate determinants of fertility. In Chapter 4, the determinants of Cuban fertility are reviewed within two broad categories: economic policies and patterns (aggregate economic growth, income distribution, levels of material consumption, old age security, male and female employment, and time constraints); and social policies and patterns (education, delivery of health services, the decline in infant mortality, and housing). The chapters of the report are followed by appendices that enumerate and evaluate relevant data sources.

As noted in greater detail in the appendices, this study has relied almost exclusively on the use of secondary materials, analysis of 1953 and 1970 Cuban census data, preliminary results of the 1981 census, annual vital statistics, and basic tabulations from the 1979 National Demographic Survey. These data, although clearly indicating trends in pre- and postrevolutionary fertility and mortality at the national and provincial level, provide only limited understanding of the factors underlying geographic and socioeconomic differentials in fertility for the 1970s. To supplement these statistics, various secondary sources pertaining to Cuban economic and social policies and patterns are incorporated into the text. These data, based on Cuban and non-Cuban sources, are rarely linked directly to fertility. However, they provide information on Cuba's socioeconomic and historical context and indirect evidence on the determinants of fertility behavior and are therefore crucial to an understanding of Cuban demographic history.

CHAPTER 2

DEMOGRAPHIC TRENDS

PREREVOLUTIONARY DEMOGRAPHIC TRENDS

Beginning in the early 1920s and ending in 1958, fertility declined consistently in Cuba, relatively rapidly through the late 1940s and more gradually through the 1950s. Estimates provided in Table 2 show a decline in the crude birth rate from 38 in 1920-24 to 28 births by the early 1950s. Estimated age-specific fertility rates, shown in Table 3 and Figure 1 for the Cuban census years from 1907 through 1953, provide greater detail on the fertility decline. Throughout the period, fertility was highest among women in their twenties. Prior to 1930, age-specific fertility rates among this group were approximately 300 births per 1,000 women per year, and the total fertility rate was consistently high; Cuban women were having an average of almost six children by the time they had completed their childbearing. By 1953, the number of births and the fertility rate among this group had declined by approximately one-third. By 1955-59, the five-year period prior to the revolution, the birth rate had declined to 27 (Comite Estatal de Estadisticas, 1980). In 1958, Cuba's total population size was estimated at approximately 6.8 million.

Immigration has also played a central role in population growth throughout most of Cuba's history. During the nineteenth century, when mortality was still very high, most of the population growth from 572,000 in 1817 to 1.6 million in 1899 was due to the immigration of Spaniards and other Europeans and the importation of African slaves and Chinese indentured servants (Thomas, 1971). As shown in Table 4, between the early 1900s and late 1920s, net international migration added approximately 600,000 people to the country's population.

TABLE 2 Estimated Measures of Fertility, 1899-1959: Cuba

Period	Crude Birth Rate		Total Fertility Rate (TFR)	Gross Reproduction Rate (GRR)	Net Reproduction Rate
1899	32.8		4.01	1.94	1.06
1900-04	42.0				
1905-09	47.6	(1907)	5.82	2.81	1.56
1910-14	43.6				
1915-19	40.4	(1919)	5.78	2.81	1.65
1920-24	37.8				
1925-29	35.9				
1930-34	34.6	(1931)	4.50	2.18	1.40
1935-39	33.8				
1940-44	33.4	(1943)	4.00	1.92	1.38
1945-49[a]	32.1				
1950-54[a]	29.7		4.01	1.95	1.64
1955-59	26.6		3.76	1.83	1.58

[a] Official figures overestimate fertility according to calculations undertaken for this report.

Sources: 1899-1949 figures: Catasus Cervera et al. (1975). GRR 1950-54: Comite Estatal de Estadisticas (1980). GRR 1955-59: JUCEPLAN, D.C.E. (1978). TFR 1950-59: Comite Estatal de Estadisticas (1980).

Spanish immigration predominated during the early 1900s, with a significant proportion of Haitian and Jamaican, other European, and American immigrants from 1914 to 1920.[1]

The wave of immigration was directly related to the expansion of the sugar industry, which lasted until the 1920s and was produced by large-scale foreign investments, mainly by the United States. However, as the depression of the 1930s set in, the decline in Cuba's economy caused male workers to return to their country of origin; during the 1930s, there was a net emigration estimated at nearly 130,000 (Collver, 1965). The onset of Cuba's fertility decline was perhaps a response to this economic crisis. Decomposition of the birth rate is impossible for the 1930s because of deficiencies in the early census data (see Appendix 2). However, as noted in Table 4, the sex ratios recorded in all Cuban censuses in the early 1900s are high, skewed toward male dominance. After 1931 the sex ratio begins to decline, reflecting the change from

TABLE 3 Age-Specific Fertility Rates for Five-Year Age Groups, and Total Fertility Rate per Woman in the Years of the Cuban Census, 1907-53: Cuba

Year	Age Group							Total Fertility Rate
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1907	122.4	305.3	301.4	224.9	146.2	54.4	9.3	5.82
1919	120.1	304.5	301.5	223.7	144.3	53.6	9.3	5.79
1931	85.1	246.6	242.8	173.7	106.7	39.3	6.3	4.50
1943	72.9	222.4	218.1	154.2	92.8	34.2	5.5	4.00
1953	58.9	205.7	203.7	139.0	79.1	28.8	4.2	3.60

Source: Catasus Cervera et al. (1975).

male-dominated immigration to male-dominated emigration and subsequently little net migration.

Aside from shifts in the age and sex composition of the population, the availability of abortion may have been an additional factor in this early fertility decline. Although the abortion law placed restrictions on availability, these were not strictly upheld in practice. Writing on the problem of abortion, Chelala-Aguilera reported an estimated 15 abortions for every 100 births between 1934 and 1936 in the Maternity Hospital of Havana; the extent of clandestine abortion was roughly estimated as 10,600 per year (Gonzalez Perez, n.d.).

Provincial data on fertility prior to the revolution (appearing later in Table 10) show that provincial crude birth rates declined about three to four points in all provinces between 1953 and 1958, except in La Habana where fertility remained constant. Prior to the revolution, low to moderately low fertility characterized most provinces. By 1958, fertility was lowest (20-22) in the provinces of La Habana and Matanzas and at moderately low levels of 23-26 in Las Villas and Camaguey provinces. Somewhat higher fertility characterized the provinces in the extreme east and west of the island (Pinar del Rio and Oriente) where a sizeable 39 percent of the 1953 population resided; there the crude birth rates for 1958 were estimated as 28 and 34, respectively (Gonzalez et al., 1978).

A variety of socioeconomic factors may be related to low fertility in the central provinces during the 1940s and 1950s. Prerevolutionary Cuba was a highly urbanized,

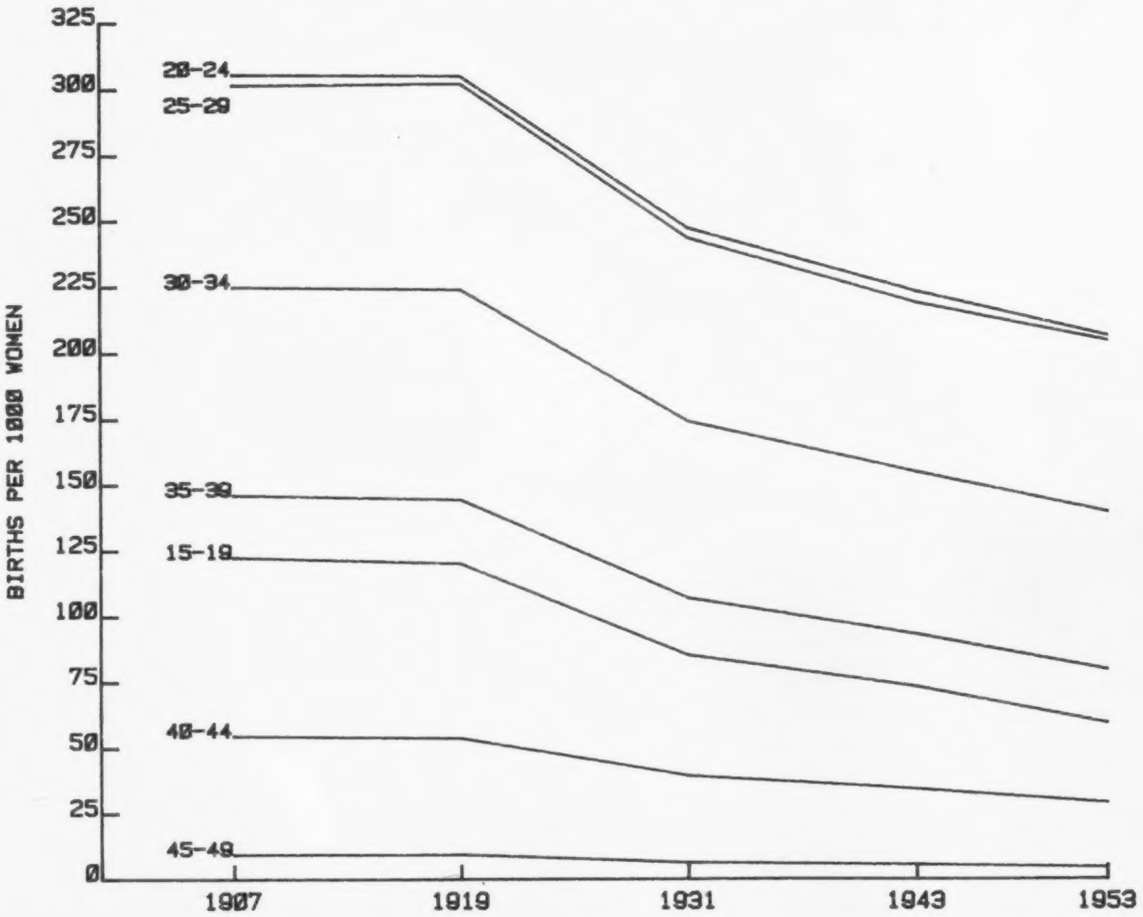


FIGURE 1 Age-Specific Fertility Rates for Five-Year Age Groups, Census Years, 1907-53: Cuba

TABLE 4 Demographic Indicators and Population Growth, 1899-1981: Cuba

Census Year	Enumerated Population	Annual Inter-censal Growth Rate (percent)	Percent Urban	Sex Ratio[a]	Population Density[b]	Net International Migration
1899	1,572,797	--	47.1	107.6	13.7	127,357 (1900-1909)
1907	2,048,980	3.3	43.9	110.3	17.9	233,535 (1910-1919)
1919	2,889,004	2.9	44.7	112.7	25.2	268,062 (1920-1929)
1931	3,962,344	2.6	51.4	113.1	34.6	-147,963 (1930-1944)
1943	4,778,583	1.6	54.6	109.6	41.7	-21,920 (1945/49-1953)
1953	5,829,029	2.0	57.0	105.0	50.9	
1970	8,569,121	2.3	60.5	105.2	77.2	-599,012 (1959-1979)
1981[c]	9,706,369	1.1	69.0	102.4	87.5	

[a] Males per 100 females.

[b] Inhabitants per square kilometer. Figures pertain to the national territory at the time of the census.

[c] Provisional data.

Sources: 1899-1970 figures: Centro de Estudios Demograficos (1976); Comite Estatal de Estadisticas (1980). 1981 figures: Comite Estatal de Estadisticas (1981a). Net international migration data 1959-79: Comite Estatal de Estadisticas (1980); Gonzalez et al. (1978); JUCEPLAN, C.E.E. (1979).

secularized country with a high proportion of European-origin inhabitants, high literacy, well-developed communication and transportation systems, and predominantly large-scale plantation farming that employed seasonal wage labor. In spite of steady and seasonal unemployment, real per capita income was higher in 1958 than in 1943; real nonagricultural wages showed consistent improvement throughout this period (Dominguez, 1978).

With regard to the proximate determinants of fertility, the absence of empirical data on abortions and contraception and the dubious quality of census data pertaining to nuptiality preclude an examination of trends and the relative significance of various intermediate variables. In the absence of organized family planning programs and modern contraceptive methods, reliance on traditional methods of contraception (condom, withdrawal, rhythm, douche) and abortion is an obvious factor. Although in theory illegal, abortions were openly performed by physicians and by less-skilled practitioners for even lower fees; they were available throughout the country, but especially in Havana. Prior to the revolution, Cuba's medical health system was highly developed through mutualist insurance plans and a fairly extensive system of public hospitals and dispensaries, which accounts in part for the low infant mortality and high life expectancy attained by the population. Analysis of provincial and rural-urban fertility differentials during the 1960s and 1970s, discussed further below, provides greater detail on these factors. The role of other factors, such as age at marriage or changes in the proportion of women in reproductive unions, cannot be determined because of statistical shortcomings in the early census data, most notably the misreporting of women in consensual unions as single women.

Table 5 illustrates a variety of estimates of Cuban mortality. The accuracy of these estimates, which are far less reliable than those of fertility, is hampered by deficiencies in death registration throughout the first part of the century; all of these estimates are approximations, considering that the census data themselves are deficient and the underlying assumptions about underregistration of deaths are incorrect. The assumptions underlying the various estimates and their calculations, as well as those underlying the calculations for this study, are discussed in Appendix 2.

According to Collver's (1965) estimates for 1920-44, mortality declined beginning in the early 1900s (CDR of

TABLE 5 Estimated Crude Birth, Death, and Infant Mortality Rates, Rates of Natural Increase, and Life Expectancy at Birth, 1900-54: Cuba

Period	Crude Birth Rate[a]	Crude Death Rate[b]	Crude Rate of Natural Increase	Infant Mortality Rate[c]		Infant Mortality Rate[d]		Life Expectancy at Birth[e]
1900-04	42.0	23.7	18.3	136	(1900)	224		
1905-09	47.6	23.3	24.3	146	(1905)	215	(1905)	36.4
1910-14	43.6	21.4	22.2	140	(1910)	207		
1915-19	40.4	22.2	18.2	136	(1915)	199	(1915)	37.2
1920-24	37.8	19.3	18.5	135	(1920)	192		
1925-29	35.9	15.2	20.7	110	(1925)	184	(1925)	39.2
1930-34	34.6	13.3	21.3	76	(1930)	167		
1935-39	33.8	12.7	21.1	78	(1935)	151	(1937)	46.4
1940-44	33.4	10.9	22.5	61	(1940)	139		
1945-49	32.1	14.1	18.0	52	(1945)	124		
1950-54	29.7	11.6	18.1		(1950)	97	(1953)	58.8
					(1952-54)	79		

Sources: [a] CBR 1900-54: Catasus Cervera et al. (1975).

[b] CDR 1900-44: Collver (1965). Collver's estimates of crude death rates from 1920-44 are underestimates. This period coincides with the era of heavy immigration into Cuba and the estimates depend on the most deficient census of the 1900s, the Cuban census of 1931. In addition, unrealistically low infant and child mortality assumptions are made for these years. CDR 1945-53: Gonzalez and Debasa (1970) overestimate mortality and are sharply out of line with previous estimates of CDR.

[c] IMR 1900-49: Collver (1965) (underestimates).

[d] IMR 1900-54: Velazquez and Toirao (1975); Mezquita (1970); Gonzalez and Debasa (1970) (overestimates).

[e] e^0 1905-53: Diaz-Briquets (1981); Gonzalez and Debasa (1970).

24), with sharper declines registered after 1925 (CDR of 15). However, Collver's figures are thought to be underestimates. The period in question coincides with the era of heavy immigration into Cuba, and Collver's estimates depend in part upon the most deficient Cuban census of the 1900s--that of 1931. In addition, the infant and child mortality assumptions made for these years are unrealistically low. The Cuban estimates of the crude death rate for the post-1945 period differ from Collver's and are similarly unreliable. The CDR of 14.1 for 1945-49 varies widely from the rates prior to 1945; the estimate of 11.6 for 1950-54 is also unacceptable. (New estimates based on age distribution from 1931 and age distribution of deaths around that time were required for the estimates constructed in Appendix 2.)

Similar variations can be found in estimates of infant mortality by Collver; they can also be found in Cuban estimates based on life tables by Velazquez and Toirao (1975) for the years 1900-50 and on estimates by Gonzalez and Debasa (1970) for the early 1950s. However, there are similar time trends: a slow persistent decline in infant mortality from 1900-04 to 1925-29, just after the decline in fertility began, and sharper declines after 1945. Following World War II, as in other developing countries, Cuba's mortality decline accelerated with the availability of modern drugs and insecticides. While the Collver figures are underestimates, those of Gonzalez and Debasa are overestimates. For as late as 1948, Gonzalez and Debasa estimate that death registration of children younger than age 5 omitted approximately 65 percent of male deaths and 62 percent of female deaths. A comparison between the Gonzalez and Debasa 1952-54 life tables and the 1953 age distribution, conducted for this study, suggests that Gonzalez and Debasa overestimate mortality, particularly for males. The age pattern of adult mortality in conjunction with the age distribution indicates a West mortality level of 19.1 for males and 18.2 for females, implying an e(5) of 61.8 for males and 63.5 for females. These levels of adult mortality are consistent with an infant mortality rate of 60 in the early 1950s, assuming that the West mortality pattern remains at a constant level at all ages. This assumption is justified by results for 1970, when the infant mortality rate derived from adjusted mortality rates in adulthood is about 38, a rate highly consistent with the estimates of child mortality around 1970 obtained from children ever born and children surviving. The lower level of child mortality is further confirmed by the fact that it produces plausible birth rates for the preceding 15 years when the reverse survival technique is applied to the age distribution. Expectation of life at birth for both sexes for 1952-53 based on the estimates constructed in Appendix 2 is 62.2; the crude death rate, given the 1953 age distribution, is 9.1; and the rate of natural increase is 19.2 per 1,000, assuming a birth rate of 28.3.

In conclusion, as Table 4 shows, Cuba's population growth rate was higher at the beginning of the century (1899-1931) than during and after World War II, mainly because of international migration. By 1958, the year prior to the revolution, Cuba's demographic profile was one of the developing world's most advanced. Life expectancy at birth was more than 60 years, and the birth rate had declined to the mid-20s per 1,000 population. Within Latin America, this life expectancy was surpassed only by rates recorded in Argentina, Uruguay, Puerto Rico, and Jamaica; only Argentina and Uruguay had achieved such low fertility. Even today, most developing nations have not yet attained the fertility levels characteristic of Cuba more than 20 years ago. Life expectancies comparable to those recorded in prerevolutionary Cuba have been reached in only a few developing countries, primarily in Latin America and East and Southeast Asia.

POSTREVOLUTIONARY DEMOGRAPHIC TRENDS

General Trends

Trends in Cuba's postrevolutionary mortality show a continuous increase in life expectancy. Although the crude death rate remained relatively stable, fluctuating between 5 and 8 deaths per 1,000 population during most of the period, infant mortality continued to decline. Official Cuban estimates indicate that infant mortality increased somewhat in the immediate postrevolutionary period perhaps due to improvements in death registration counts, balanced by the emigration of physicians during the early postrevolutionary years; in actuality, however, the rate may have continued to fall. After a period during which infant mortality showed little general trend in the late 1960s (40 per 1,000 in 1965, 39 per 1,000 in 1970), the 1970s saw a period of sharp decline with a provisional rate of 18.5 by 1981, the lowest infant mortality rate in Latin America.

For around 1970, an evaluation of registered deaths made for the present study (see Appendix 2) suggests that male deaths were effectively completely registered up to age 60 or so, whereas there was still some underregistration of female deaths. After adjustment, male deaths imply an East model life table level of 22.1, while female deaths imply a level of 21.3. The implied infant mortality rate is 38; this is highly consistent with the indirect estimates available from the 1974 National Survey of Income and Consumer Expenditures of the Population and the 1979 National Demographic Survey, which both indicate an East level of around 22.0 for both sexes for around 1970. These figures are also in close agreement with the official infant mortality rate for 1970 of 38.8. (A difference of half a level in child mortality in favor of males is supported for both 1953 and 1970 by the reverse survival calculations, which give plausible sex ratios at birth in both years using this difference.) The crude death rate for 1970, applying the selected life tables to the census age distribution, is 7.5; however, this rate is exaggerated by overreporting of age at older ages. Simply adjusting reported deaths for estimated coverage gives a death rate of 6.7, but this rate is biased downward by omission of deaths at old ages. The true value probably lies between 6.7 and 7.5, but should be higher than the official figure of 6.3.

However, for the most recent time period, 1976 onward, indirect estimates of child mortality obtained from the 1979 National Demographic Survey (see Appendix 2) do not corroborate the pace of the apparent decline in infant and child mortality. The proportions dead among children born of young mothers, those most affected by a recent decline, are actually higher for 1979 than for 1974--.0343 against .0281 for women aged 15-19, .0357 against .0351 for those aged 20-24. Although the indirect mortality estimates described in Appendix 2 and the official figures are not strictly comparable, the proportions for 1979 are not consistent with infant mortality rates in the low 20s from 1976 to 1979; rather, an infant mortality level of around 30 for 1976-79 is suggested, with no very pronounced trend. Thus, the indirect estimates suggest similar infant mortality and higher adult mortality around 1970 than the official series and do not corroborate the rapid decline in infant and child mortality since 1975, although sampling biases and the possible inclusion of abortions among dead children may account for this discrepancy.

TABLE 6 Demographic Trends, 1953-81: Cuba

Year	Crude Birth Rate	General Fertility Rate[a]	Crude Death Rate	Infant Mortality Rate	Estimated Total Population[b]	Crude Rate of Natural Increase[c]
1953	28.3	129.2			6,128,797	
1954	28.1	126.4			6,156,173	
1955	27.5	123.7			6,279,474	
1956	26.6	120.0			6,408,944	
1957	26.1	118.0			6,539,282	
1958	26.1	119.6	7.3	36.7	6,763,061	18.8
1959	27.7	127.1	7.4	37.6	6,900,888	20.3
1960	30.1	138.0	7.0	40.4	7,027,212	23.1
1961	32.5	150.1	7.1	41.8	7,134,003	25.4
1962	34.3	158.1	7.7	45.7	7,254,377	26.6
1963	35.1	162.9	7.3	41.1	7,414,886	27.8
1964	35.0	164.5	6.9	40.0	7,612,277	28.1
1965	34.3	163.0	7.1	39.7	7,809,918	27.2
1966	33.5	158.7	6.4	37.3	7,885,519	27.1
1967	31.7	153.0	6.3	36.4	8,139,334	25.4
1968	30.4	147.5	6.5	38.3	8,283,935	23.9
1969	29.2	142.1	6.6	46.7	8,421,050	22.6
1970	27.7	135.1	6.3 (6.7-7.5)[d]	38.8 (38)[d]	8,551,390	21.4
1971	29.5	143.2	6.0	36.5	8,691,660	23.5
1972	28.0	136.1	5.6	28.7	8,859,413	22.4
1973	25.0	121.6	5.6	29.6	9,034,564	19.4
1974	22.0	107.3	5.8	29.3	9,192,136	16.3
1975	20.7	100.0	5.5	27.5	9,335,380	15.2
1976	19.8	94.2	.6	23.3 (35)[d]	9,470,968	14.2
1977[a]	17.6	82.3	5.8	25.0	9,592,974	11.8
1978[a]	15.3	70.0	5.7	22.3	9,693,736	9.6
1979[a]	14.7	65.7	5.6	19.3	9,774,616	9.1
1980[a]	14.1	62.1	5.7	19.6	9,731,766	8.4
1981[a]	14.0	60.0	--	18.5	9,706,369	--

[a] Provisional rates.

[b] Estimates of population on June 30 of each year, calculations based on preliminary results of 1970 census.

[c] Crude birth rate minus crude death rate.

[d] Estimates by Hill (see Appendix 2).

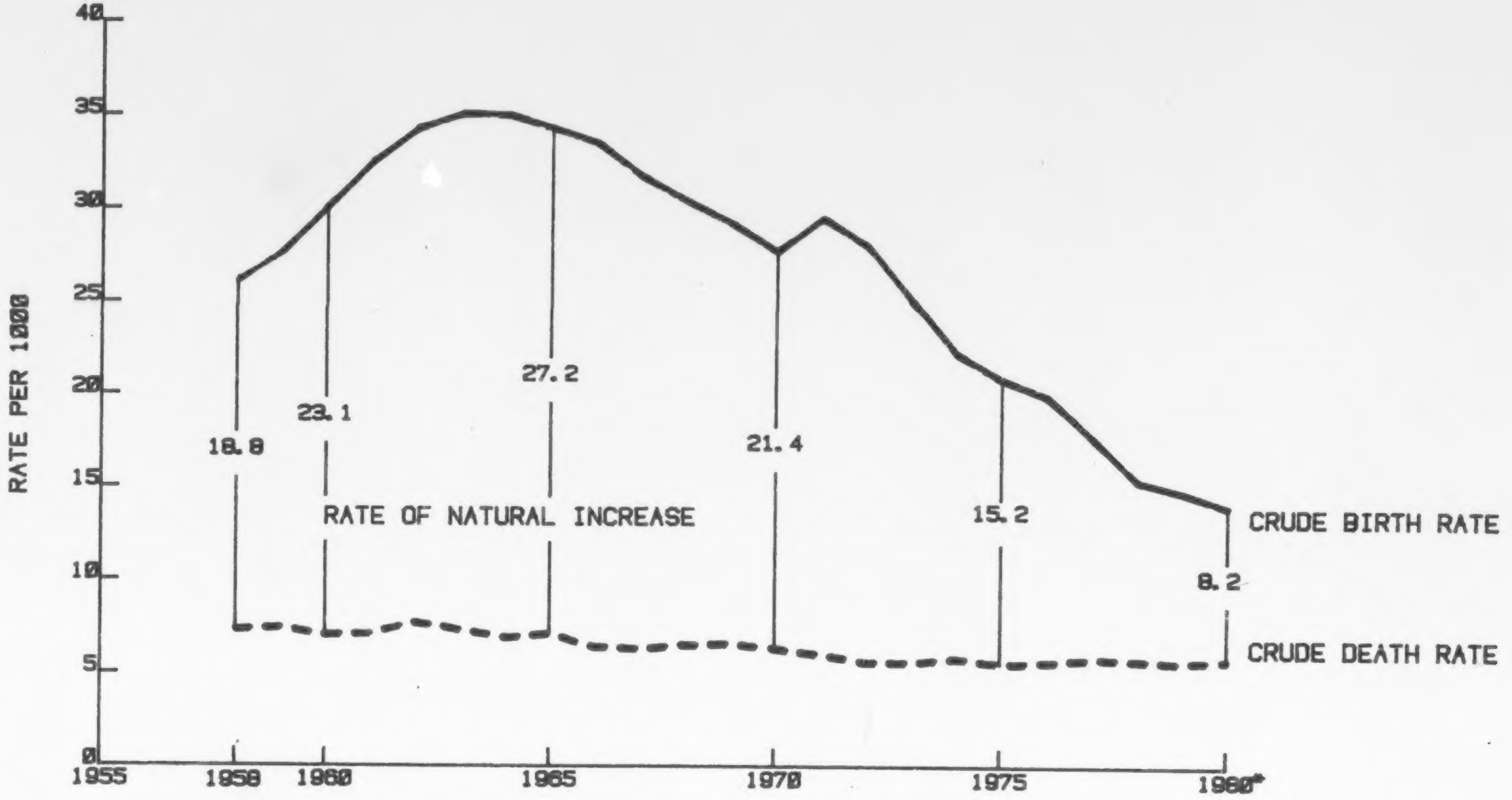
Sources: 1953-65 figures: Landstreet and Mundigo (1978:Table 1); Ministerio de Salud Publica de Cuba (1978, 1979, 1981); age composition of the female population based on data from United Nations (1976). 1966-80 figures: JUCEPLAN, C.E.E. (1981); Ministerio de Salud Publica de Cuba (1978, 1979, 1980, 1981); United Nations (1976); 1981 figures: Comite Estatal de Estadisticas (1981a); UNFPA (1982a, 1982b).

Postrevolutionary fertility trends show three distinct phases. As noted in Table 6, during the postrevolutionary baby boom period from 1959-64, the crude birth rate increased from 28 per 1,000 population to 35 (similar to the birth rate estimated for 1920-24). The general fertility rate increased from 127 births per 1,000 women of reproductive age in 1959 to 165 births in 1964, triggered by increased childbearing among younger women. The baby boom was followed by a slow decline in fertility from 1965 to 1973, except in 1971, which registered a slight rise. This rise in part may reflect a postponement of births in 1970, when some 190,000 to 235,000 workers were mobilized from the cities in an attempt to harvest ten million tons of sugar cane, nearly double the average produced annually during the 1960s, creating an upheaval in other sectors of the economy.[2] The brief fertility rise may also have been related to the marked rise in marriages in the late 1960s and early 1970s, when, concomitant with a period of heavy emigration from Cuba, crude marriage rates doubled over the previous rates for the mid-1960s. By 1973, the crude birth rate (25 births per 1,000 population) and general fertility rate (122 births per 1,000 women aged 15-44) had finally approached prerevolutionary levels.

Trends in fertility from 1973 to 1981 have been particularly striking. The crude birth rate declined 44 percent to an extremely low rate of 14 births per 1,000 population in 1981; the general fertility rate declined from 122 to 60 births per 1,000 women aged 15-44. The latest decline in fertility, occurring at a time when the crude death rate had stabilized at a low level of 5.6-5.8 deaths per 1,000 population, resulted in a decline in crude rates of natural increase from 19 in 1973 to 8 by 1980.

Figure 2 illustrates the course of Cuba's birth rate from 1958 to 1980, based on official figures in Table 6. The low death rate of 5.7 per 1,000 population in 1980 is far below the U.S. rate of 8.7 for the same year, reflecting the young age of the population, as well as continuing improvements in health since 1959. Cuba's 1980 crude rate of natural increase (8) compares with 7 in the U.S. and, along with the rates for Barbados and Uruguay, is now the lowest of all the Caribbean and Latin American nations (National Center for Health Statistics, 1981; Population Reference Bureau, 1982).

Concurrent with fertility decline, emigration from Cuba over the past 20 years has reduced population growth rates even further. The nation's postrevolutionary baby boom was partially offset by emigration, which reached an early peak between 1960 and 1962, interrupted in late 1962 by the missile crisis. A subsequent wave of emigration from late 1965 until 1972 resulted from an agreement between the U.S. and Cuban governments. If not for a net emigration of approximately 507,422 persons, the Cuban growth rate of 2.0 percent for the decade 1960-70 would have been approximately 2.6 percent.



* PROVISIONAL (1977-1980)

FIGURE 2 Trends in Population Growth, 1958-80: Cuba

The latest surge in emigration, through the Mariel small-boat evacuation, permitted the departure of an additional 125,000 Cubans. The emigration was officially ended by U.S. authorities in mid-1980; additional population losses occurred through subsequent illegal immigration into Florida. Latest Cuban data show a decline in the total population to an estimated 9,731,766 in 1980 through the emigration of 124,000 people; the estimated population for 1981, according to preliminary census figures, is 9,706,369 (Comite Estatal de Estadisticas 1981a).[3]

The combination of a fluctuating birth rate and sizable emigration is reflected in Cuba's population pyramid. The estimated 1980 pyramid, based on data in Table 7 and depicted in Figure 3, shows a rather large bulge between ages 5 and 19, the age group containing the population born during the baby boom years of the early 1960s. The disproportionately large size of the bars at these ages also reflects infant mortality declines. The marked indentation below age 5 is produced by the very rapid fertility decline in recent years, particularly since the mid-1970s. Above age 20, the shape of the pyramid is consistent with what might be expected in a country that has experienced a gradual fertility decline to moderate levels by the late 1950s, accompanied by an equally gradual mortality decline.

Trends in Age-Specific Fertility

More detailed analyses of Cuban fertility trends in the immediate pre- and postrevolutionary periods are based on Cuban and CELADE estimates for five-year intervals from 1950-55 to 1975-80 and Cuban estimates for single-year intervals from 1970-80, shown in Tables 8 and 9 and depicted graphically in Figures 4 and 5. These estimates suggest that the postrevolutionary baby boom occurred among all age groups, but resulted primarily from a shift toward earlier childbearing and higher fertility among younger women, especially those aged 15-19 and 20-24; fertility among older women age 35 and over shows less significant increases (see Figure 4). The subsequent decline in the late 1960s can be attributed to lower marital fertility, primarily among women age 25 and above. By 1970, all age groups (with the exception of those 15-19) had experienced fertility declines, with 20-29 as the primary reproductive period, indicating a

TABLE 7 Data for Population Pyramid, 1980: Cuba

Age Group	Male	Female
0-4	4.12	3.93
5-9	5.71	5.47
10-14	6.18	5.92
15-19	5.98	5.70
20-24	4.07	3.91
25-29	3.80	3.68
30-34	3.57	3.48
35-39	3.24	3.15
40-44	2.82	2.75
45-49	2.26	2.23
50-54	2.07	2.05
55-59	1.76	1.73
60-64	1.62	1.54
65-69	1.38	1.29
70-74	1.10	.99
75-79	.84	.72
80+	.48	.47
Total	50.99	49.01

Source: Comite Estatal de Estadisticas and CELADE (1980b:Table 3).

further shift toward earlier childbearing and sustained lower fertility among women age 25 or older.

The total fertility rate expresses the average number of births per woman if all women lived to the end of their childbearing years and bore children according to a given set of age-specific fertility rates. This rate increased from 3.8 in the late 1950s to 4.7 in 1960-65 and subsequently declined in the latter 1960s to 4.3. By 1970-75, the figure finally fell to 3.5, below prerevolutionary levels (according to Cuban figures). Similarly, the gross reproduction rate[4] of 1.8 female births per woman in 1955-60 increased to 2.3 in 1960-65, then declined to 1.8 by 1970, to .93 by 1978, and to .77 by 1980. Cuban fertility is currently well below "replace-

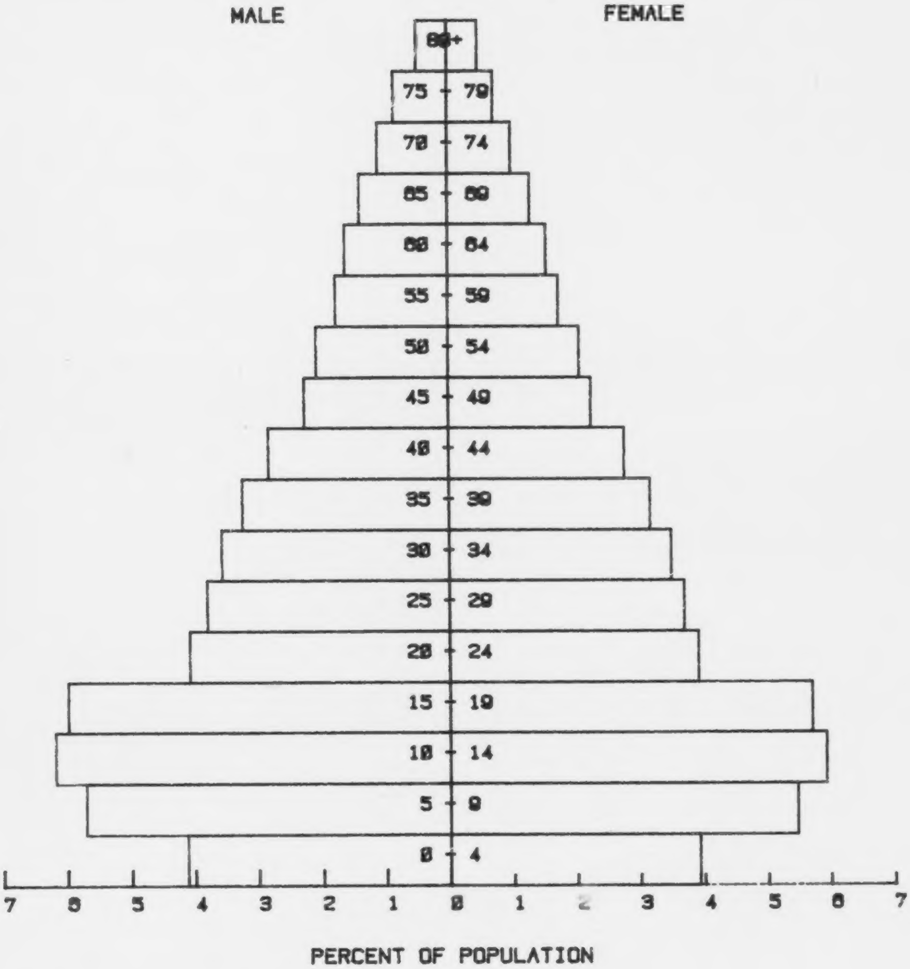


FIGURE 3 Population Pyramid, 1980: Cuba

ment level"; that is, if fertility continued at this level, annual births would eventually fall to or below the level of deaths, and Cuba's population would cease growing from natural increase.

Table 9 and Figure 5 compare downward trends in age-specific fertility rates, reflected in the rapid birth rate decline since 1973. From 1973 to 1980, birth rates fell by 70 percent or more among women aged 30 to 44 and 87 percent among less fertile women 45 or older; among women 25-29, fertility remained stationary from 1970-72 before descending; among women aged 20-24 and 15-19, fertility peaked in 1971-72 and subsequently

TABLE 8 Fertility Rates, 1950-80: Cuba

Age Group	Births per 1,000 Women					
	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80
15-19	65.4	78.8	119.7	130.1	137.5	75.4
20-24	228.4	214.4	266.4	244.8	190.2	156.5
25-29	226.4	201.9	237.9	206.8	161.3	107.9
30-34	154.5	138.7	164.8	144.4	108.2	56.7
35-39	87.9	81.8	100.9	92.0	65.1	28.8
40-44	32.0	29.6	36.3	32.8	26.0	9.8
45-49	7.3	6.7	8.1	7.3	5.8	1.0
Total Fertility Rate	4.01	3.76	4.67	4.29	3.47	2.18
Gross Reproduction Rate	1.95	1.83	2.27	2.09	1.69	1.06
Net Reproduction Rate	1.64	1.58	2.03	1.92	1.59	1.02

Sources: Comite Estatal de Estadisticas (1980); Comite Estatal de Estadisticas and CELADE (1981:Tables 5 and 6).

declined (47 and 41 percent, respectively). Among this latter youngest group, the speed of decline lagged somewhat until 1977, when fertility dropped precipitously.

The age-specific fertility rates of Cuban women aged 15-19 during the mid-1970s are similar to those recorded for Panama and Jamaica (123-130) in the same time period; they are higher than those estimated for Costa Rica, the Dominican Republic, Martinique, Mexico, and Puerto Rico (ranging between 51 and 110 births per 1,000 women aged 15-19) and for all of the South American countries except Paraguay (Population Reference Bureau, 1981). The age-specific fertility rates of Cuban women aged 15-19 declined during the late 1970s, approaching the levels achieved by many Latin American countries in the mid-1970s; however, the rates are still high when compared to age-specific fertility rates of young women in other low-fertility nations.

TABLE 9 Fertility Rates, 1970-80: Cuba

Age Group	Births per 1,000 Women											Percentage Change 1973-80
	1970	1971	1972	1973	1974	1975	1976	1977	1978[a]	1979[a]	1980[a]	
15-19	127.5	146.5	143.8	134.7	129.7	127.1	126.5	103.3	83.0	74.5	80.2	-40.5
20-24	227.4	245.7	237.6	208.3	182.3	178.3	170.7	155.4	137.2	131.8	110.9	-46.8
25-29	164.6	174.7	167.9	146.1	125.4	116.1	111.2	96.9	83.9	80.2	68.4	-53.2
30-34	116.3	120.3	113.0	97.6	80.2	67.3	59.9	53.3	45.6	43.7	35.5	-63.6
35-39	73.5	71.1	66.1	56.2	46.2	36.6	32.3	28.0	23.9	22.4	16.4	-70.8
40-44	25.8	25.6	23.7	21.2	16.3	13.4	11.1	9.7	8.2	7.6	4.3	-79.7
45-49	3.9	2.8	2.7	3.1	2.5	2.2	1.9	1.7	1.5	1.4	0.4	-87.1
Total Fertility Rate	3.70	3.93	3.77	3.34	2.91	2.70	2.37	2.24	1.92	1.81	1.58	-52.7
Gross Reproduction Rate	1.80	1.91	1.83	1.62	1.42	1.32	1.16	1.09	.93	.88	.77	-52.5

[a] Preliminary rates.

Sources: 1970-79 figures: Comite Estatal de Estadisticas in Avalos Triana Monent (1981:Tables 3 and 4); Comite Estatal de Estadisticas (1980). 1980 figures: Ministerio de Salud Publica de Cuba (1981).

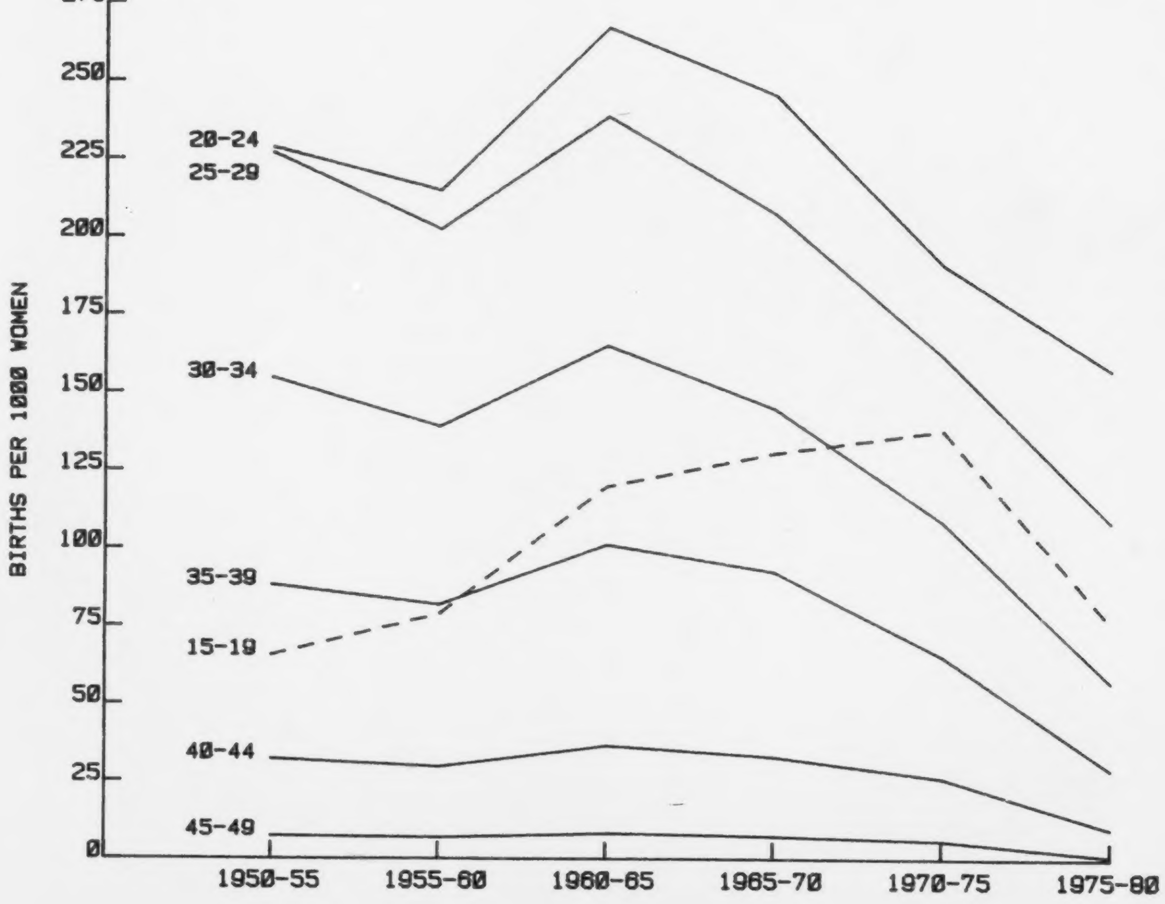


FIGURE 4 Fertility Rates, 1950-80: Cuba

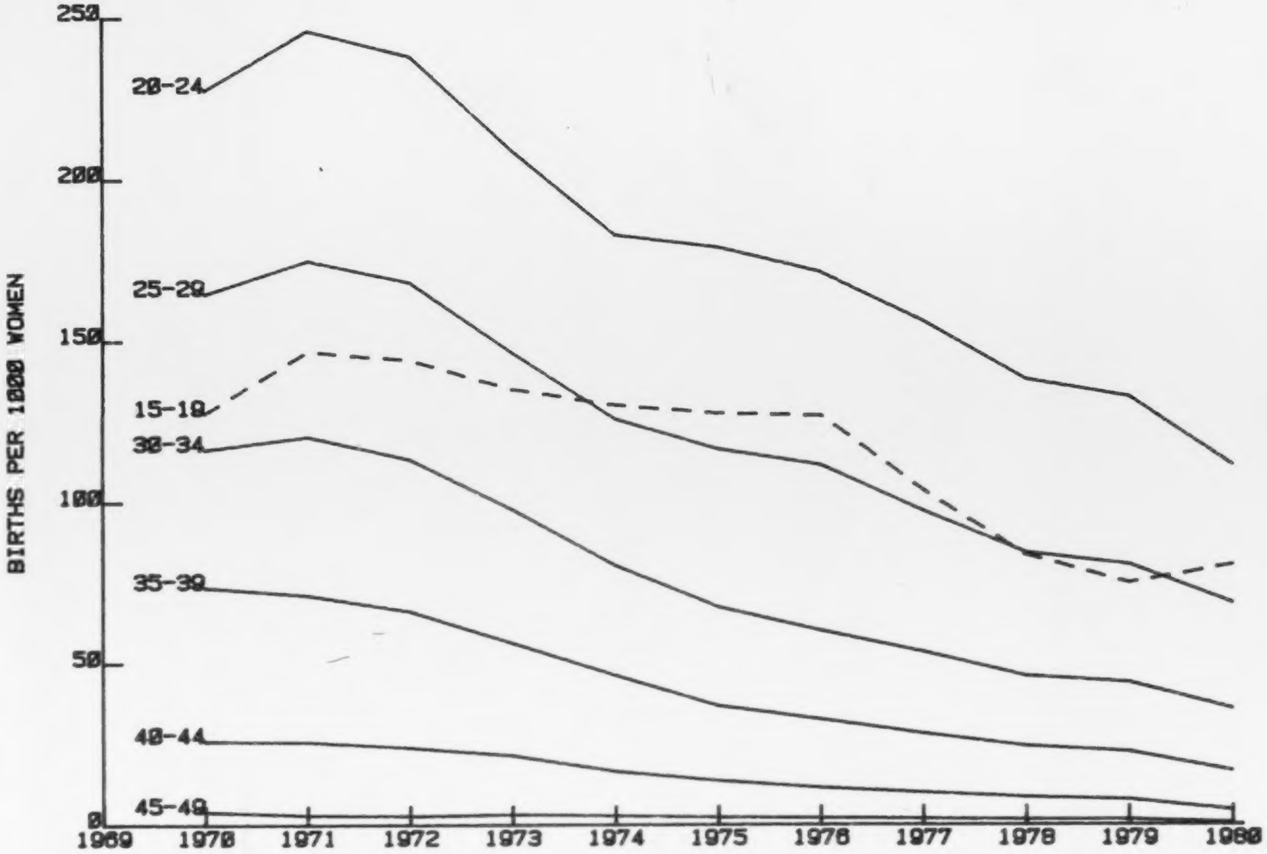


FIGURE 5 Age-Specific Fertility Rates, 1970-80: Cuba

Trends in Provincial and Rural-Urban Fertility

Additional data on fertility in postrevolutionary Cuba are provided by provincial crude birth rates calculated for all years from 1953-80, with the exception of 1976 (see Table 10). In Fall 1976, a new political and administrative division of national territory was established to facilitate regional economic planning. In place of the six provinces that had existed since the nineteenth century, 14 were created, with Isla de Pinos (now named Isla de la Juventud) as a special municipality outside the new system. Within these provinces, a total of 169 municipalities was created. Figure 6 provides a map of Cuba with its new political divisions. To permit time-series comparison, Cuban data for 1977-80, available for the 14 provinces, have been recombined to correspond to the original six provincial divisions.

As previously noted in the discussion of prerevolutionary fertility trends, provincial crude birth rates declined from 1953 to 1958, except in La Habana, where fertility remained constant. In 1959, at the inception of the postrevolutionary baby boom, crude birth rates were lowest for the provinces of La Habana and Matanzas (22-23 births per 1,000 population), moderately low in Las Villas and Camaguey provinces (25-27), and highest for the rural provinces at the extreme eastern and western ends of the island, Pinar del Rio and Oriente (30-35). The postrevolutionary baby boom, peaking in 1964, occurred in all provinces, but was sharpest in La Habana, Matanzas, and Las Villas, where the crude birth rates increased 41, 36, and 34 percent, respectively, over 1959 rates. The smallest increase (14 percent) was recorded in Oriente province, which originally had the highest fertility.

By 1970, provincial crude birth rates had again approximated their prerevolutionary levels. From 1964 (the peak year of the postrevolutionary baby boom) to 1980, the crude birth rate fell at least 59 percent in all provinces, with the greatest decline recorded in La Habana (63 percent decline in fertility). Of equal significance is the reduction in interprovincial fertility differentials. Data for 1980 for both the old and new provincial divisions show that the crude birth rate was below the national average, ranging from 11 to 14 live births per 1,000 population in the central western provinces of La Habana (now La Habana and Ciudad de la Habana provinces), Matanzas, Las Villas (now Villa Clara, Cienfuegos, and Sancti Spiritus provinces), and part of Oriente province (Holguin); above the national level (14.2-16.4) in the central eastern provinces of Camaguey (now Camaguey and Ciego de Avila), Pinar del Rio, and part of Oriente province (now Las Tunas and Santiago de Cuba); and highest (18-21) in another part of Oriente (now Guantanamo and Granma) and Isla de Pinos (now Isla de la Juventud), areas in which only 13 percent of the 1980 population resided. Thus, between 1959 and 1980, fertility differentials among provinces had narrowed, and the proportion of the population residing in the peripheral regions had declined considerably.[5]

Analysis of fertility levels and provincial and rural-urban differentials for the period 1965-77, based on estimates of fertility obtained through the own-children methodology, are illustrated in Tables 11 and 12 and Figures 7, 8, and 9. The data base is the 1979 Cuban National Demographic Survey, conducted March 22-31, which gathered data on household composition and socioeconomic variables on a sample of 68,046 households with a total of 326,174 persons, or 4 percent of all Cuban households[6] (Comite Estatal de Estadisticas and CELADE, 1981).

Table 11 shows the total fertility rates for former provincial divisions and rural-urban areas between 1965 and 1977. The total fertility rate declined about 50 percent, from 4.6 in 1965 to 2.3 in 1977. As noted, above, this decline was steady except for a slight rise or stabilization in some provinces in 1971-72, probably due to higher marriage rates in 1970-71 and postponement of births in 1970 with the mobilization of the population for the sugar cane harvest. In 1965, toward the end of the baby boom period, fertility rates were highest in the extreme eastern and western provinces of Pinar del Rio and Oriente (with TFRs of 4.9 and 5.4, respectively) in which the rural population constituted a majority (52 percent and 54 percent, respectively) (see Figure 7).

In urban areas, the total fertility rate of 4.1 in 1965 was already moderately low and clearly descending. In the rural areas, fertility was much higher (TFR of 6.0) and declined only after 1967. The interruption in the decline of fertility in the early 1970s occurred almost exclusively in the urban areas. As noted in Figures 8 and 9, declines in fertility between 1965 and 1977 were particularly sharp in rural areas, and by 1977, rural-urban differentials in fertility had been considerably reduced (TFR of 2.1 in urban areas and 2.7 in rural areas).

TABLE 10 Crude Birth Rates by Former Provincial Division, 1953-80: Cuba

Year	Province						
	Pinar del Rio	La Habana[a]	Matanzas	Las Villas	Camaguey	Oriente	Isla de la Juventud
1953	32.0	18.7	24.4	26.7	29.3	37.4	
1954	31.1	18.7	23.7	25.8	28.3	36.6	
1955	30.2	18.9	23.0	24.9	27.2	35.6	
1956	29.0	18.6	21.9	23.7	25.9	34.6	
1957	28.3	18.7	21.3	22.9	25.3	33.9	
1958	28.4	19.6	21.6	23.0	25.5	33.9	
1959	29.7	21.9	23.4	24.6	27.2	35.0	
1960	32.0	25.2	26.1	27.1	29.7	36.5	
1961	34.4	28.3	28.9	29.7	32.3	37.9	
1962	35.9	30.5	30.9	31.8	34.5	39.2	
1963	36.7	31.3	31.7	32.7	35.4	39.8	
1964	36.6	30.8	31.8	33.0	35.3	39.8	
1965	35.7	29.5	30.9	32.5	34.5	39.5	
1966	34.5	27.7	29.5	31.5	33.1	38.7	
1967	33.2	25.4	27.9	30.2	31.6	38.0	
1968	32.1	23.1	26.4	28.9	30.2	37.5	
1969	31.0	20.9	25.1	27.9	29.0	36.9	
1970	29.7	18.5	23.8	27.8	27.7	35.7	
1971	30.3	23.6	27.9	28.4	28.4	34.8	
1972	28.5	22.7	25.8	27.4	26.1	33.0	
1973	25.5	20.0	22.4	23.4	24.1	30.1	
1974	23.4	17.9	19.0	19.2	21.6	26.9	

1975	21.7	16.2	18.6	17.6	22.0	25.2	
1976[b]	--	--	--	--	--	--	
1977	19.7	14.3	15.9	15.6	18.7	20.8	22.1
1978[c]	18.0	12.5	14.0	13.8	15.8	17.6	20.0
1979[c]	16.6	11.8	12.6	13.2	15.4	17.3	19.8
1980[c]	15.0	11.5	12.2	12.8	14.4	16.4	21.0
Percent Change							
1953-58	-11.3	+ 4.8	-11.5	-13.9	-13.0	- 9.4	
1959-64	+23.2	+40.6	+35.9	+34.1	+29.8	+13.7	
1965-72	-20.2	-23.1	-16.5	-15.7	-24.3	-16.5	
1973-80	-41.2	-42.5	-45.5	-45.3	-40.2	-45.5	

Note: -- indicates data unavailable.

[a] Political emigration, predominantly from La Habana province, was notable during 1958-63 and 1965-72.

[b] In Fall 1976 a new political and administrative division of national territory was established. In place of the six provinces noted in this table, 14 were created. The provinces of Pinar del Rio and Matanzas remain essentially the same. For comparative purposes the data for 1977-80 have been retabulated to match the same provincial boundaries existing prior to 1976. At present, La Habana province is divided into the city of Havana and the rest of the province; Las Villas into Cienfuegos, Villa Clara, and Sancti Spiritus; Camaguey into Ciego de Avila and Camaguey; and Oriente into Las Tunas, Holguin, Granma, Santiago de Cuba, and Guantanamo. In addition, Isla de la Juventud was made a municipality outside the new system.

[c] Provisional.

Sources: 1953-59 figures: Gonzalez et al. (1978:Vol. 1, Table III-26). 1953-59 figures: Gonzalez et al. (1978:Table III-26). 1960-75 figures: JUCEPLAN, C.E.E. (1976:Table 10). 1977-80 figures: Ministerio de Salud Publica de Cuba (1978, 1979, 1980, 1981).

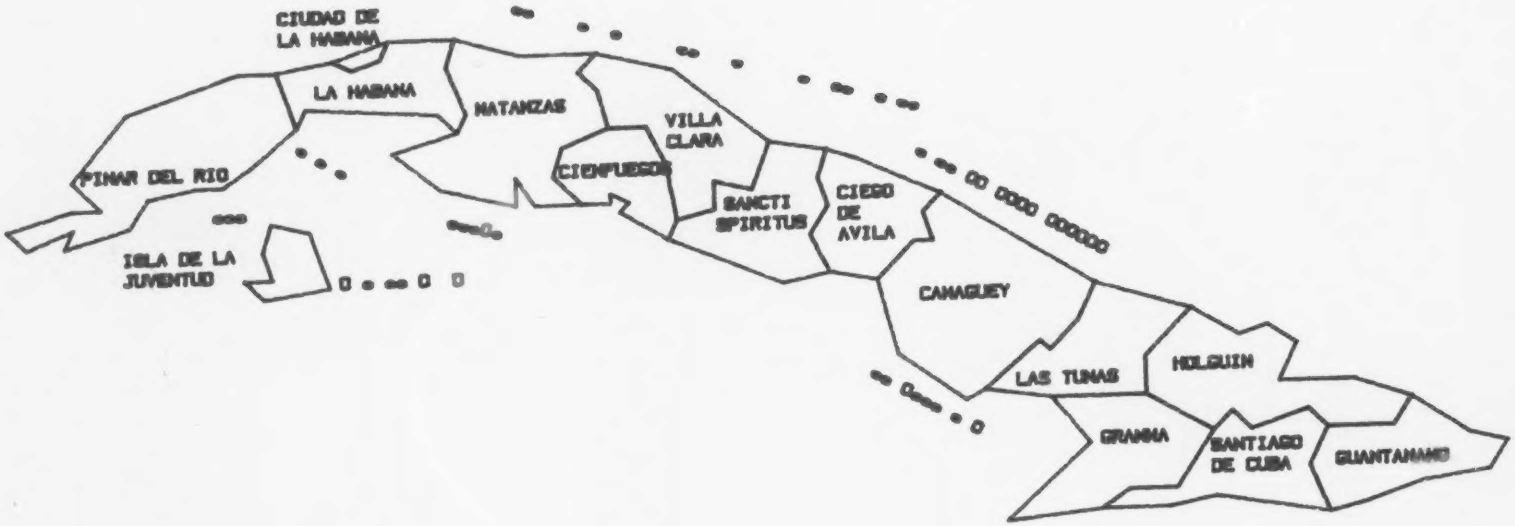

CIUDAD DE LA HABANA
LA HABANA
MATANZAS
VILLA CLARA
CIENFUEGOS
SANCTI SPIRITUS
CIEGO DE AVILA
PINAR DEL RIO
ISLA DE LA JUVENTUD
CAMAGUEY
LAS TUNAS
HOLGUIN
GRANMA
SANTIAGO DE CUBA
GUANTANAMO

FIGURE 6 Provincial Map: Cuba

Trends in provincial fertility are similar. In Oriente and Pinar del Rio, characterized by a higher proportion of rural population, the decline in total fertility was steady and uninterrupted. In the other provinces, all of which were more urbanized and had lower fertility, some stabilization and slight increases in fertility were recorded in the early 1970s, with fertility descending again in 1973 (Figure 7). Although these fertility differentials among the six provinces remained basically similar, by 1977 the largest provincial differentials in total fertility had been considerably reduced (2.6 in Oriente and 1.9 in La Habana). The majority of the urban population (with the exception of Oriente) and the rural population of Matanzas and Las Villas had arrived at or near replacement-level fertility.

Table 12 shows total fertility rates for the period 1971-77 by new provincial divisions and rural-urban areas. Total fertility rates in the range of 1.9 to 2.3 characterized seven provinces (Ciudad de la Habana, Matanzas, La Habana, Villa Clara, Cienfuegos, Sancti Spiritus, and Ciego de Avila); rates of 2.4 to 2.6 were noted in four provinces (Pinar del Rio, Camaguey, Granma, and Santiago de Cuba); while higher rates of 2.7 to 2.9 were found in three (Holguin, Las Tunas, and Guantanamo). As previously mentioned, by 1980, crude birth rates were in the highest group in only two provinces: Guantanamo and Granma.

Fertility Desires

Data on fertility desires of Cuban women are available through basic tabulations from the 1979 National Demographic Survey, which questioned women aged 14-44 on the number of additional children they would like to have aside from those they already had. Women aged 45-49 in the sample were not asked such questions, on the assumption that they had already completed their family size. A second measure of the demand for children, expected family size, was constructed by totaling for each woman her number of surviving births and the additional number desired.[7]

When responses are classified by the current number of surviving births (Table 13), some unusual results appear: 41 percent of the women aged 14-44 living in union who were childless at the time of the survey (no births or surviving births) stated that they did not want additional children. This figure is much higher than the statistics

TABLE 11 Total Fertility Rates, by Former Provincial Division and Rural-Urban Residence, 1965-77: Cuba

	Births per 1,000 Women, 15-49												
Province	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
CUBA													
Total	4.6	4.5	4.3	4.2	4.0	4.0	4.0	3.7	3.4	3.0	2.8	2.6	2.3
Urban	4.1	3.9	3.6	3.5	3.4	3.4	3.5	3.3	2.8	2.5	2.4	2.3	2.1
Rural	6.0	5.9	5.9	5.6	5.3	5.2	5.1	4.9	4.4	3.9	3.6	3.3	2.7
Pinar del Rio													
Total	4.9	4.7	4.5	4.3	4.2	4.0	3.9	3.7	3.4	3.0	2.8	2.6	2.4
Urban	4.3	4.2	4.1	3.9	3.6	3.6	3.5	3.3	2.9	2.6	2.4	2.3	2.2
Rural	5.4	5.2	5.0	4.8	4.7	4.5	4.4	4.2	3.8	3.4	3.1	2.9	2.6
La Habana													
Total	3.7	3.5	3.2	2.9	2.7	2.7	2.8	2.8	2.6	2.4	2.2	2.1	1.9
Urban	3.6	3.4	3.2	2.9	2.6	2.6	2.8	2.8	2.5	2.3	2.0	1.9	1.7
Rural	5.1	4.9	4.3	4.0	3.5	3.5	3.4	3.5	3.2	3.1	3.0	2.8	2.5
Matanzas													
Total	4.2	4.1	3.8	3.6	3.4	3.4	3.5	3.4	3.0	2.6	2.4	2.3	2.0
Urban	3.9	3.8	3.5	3.4	3.1	3.2	3.2	3.3	3.0	2.7	2.3	2.1	1.9
Rural	5.0	4.8	4.6	4.2	4.0	3.9	4.0	4.0	3.6	3.2	2.9	2.7	2.3

Las Villas													
Total	4.4	4.3	4.1	4.0	3.8	3.8	3.8	3.6	3.2	2.7	2.5	2.3	2.1
Urban	4.0	3.9	3.7	3.6	3.6	3.8	3.8	3.6	3.0	2.4	2.2	2.1	2.0
Rural	5.0	4.8	4.8	4.4	4.2	4.1	4.3	4.1	3.7	3.3	3.0	2.6	2.3
Camaguey													
Total	4.6	4.5	4.3	4.2	4.0	3.6	3.8	3.6	3.3	3.1	3.0	2.8	2.4
Urban	4.3	4.3	4.2	3.8	3.5	3.4	3.6	3.3	3.0	2.8	2.8	2.7	2.3
Rural	5.2	5.5	5.3	5.1	4.7	4.5	4.4	4.3	3.9	3.7	3.3	3.2	3.1
Oriente													
Total	5.4	5.3	5.2	5.1	5.0	4.8	4.5	4.2	3.8	3.5	3.3	3.0	2.6
Urban	4.7	4.6	4.6	4.4	4.2	4.0	3.8	3.6	3.2	2.9	2.7	2.8	2.7
Rural	6.6	6.4	6.4	6.4	6.4	5.7	5.7	5.7	5.0	4.5	4.0	3.7	3.1

Note: Based on women aged 15-49.

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 7).

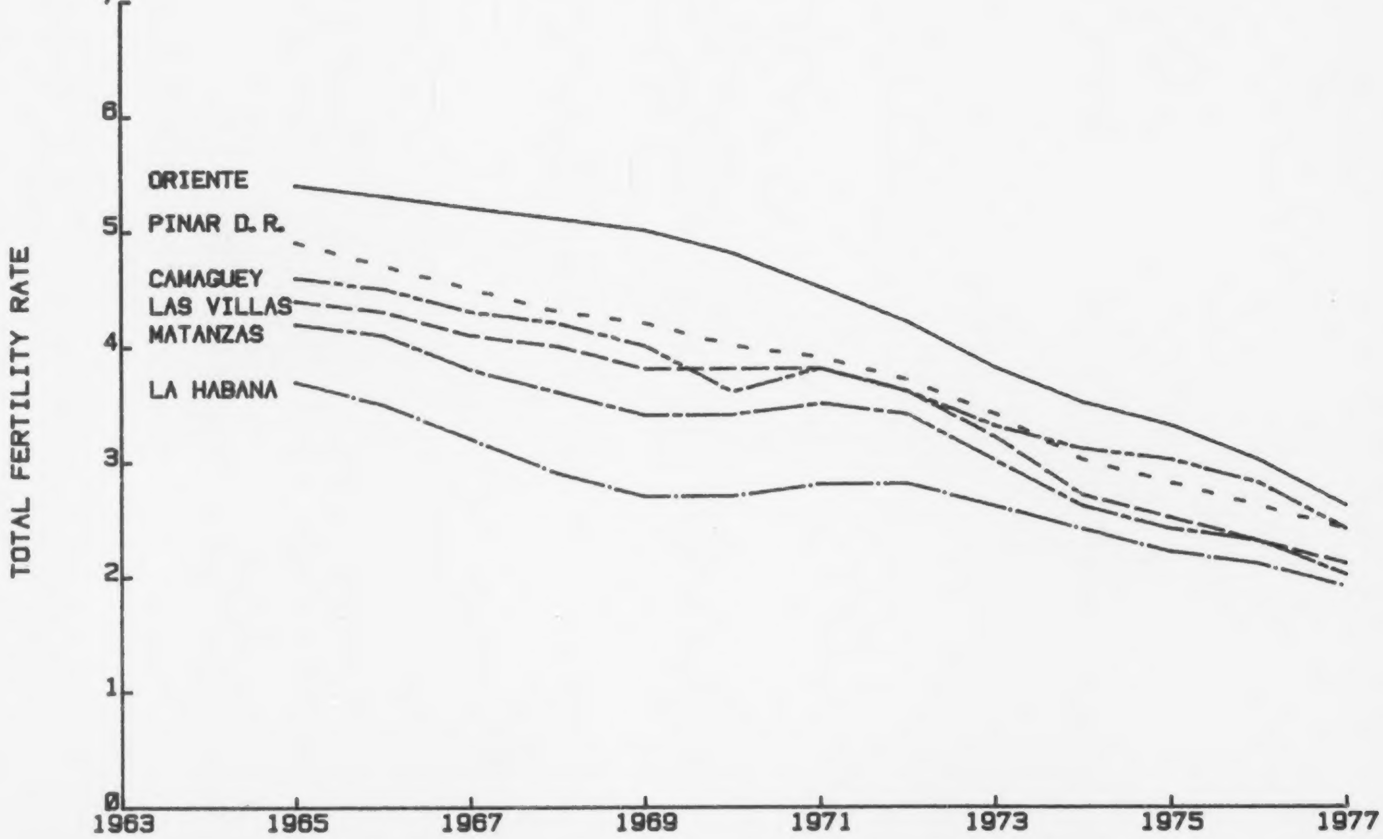


FIGURE 7 Total Fertility Rates, Rural and Urban Areas, Selected Years, 1965-77: Cuba

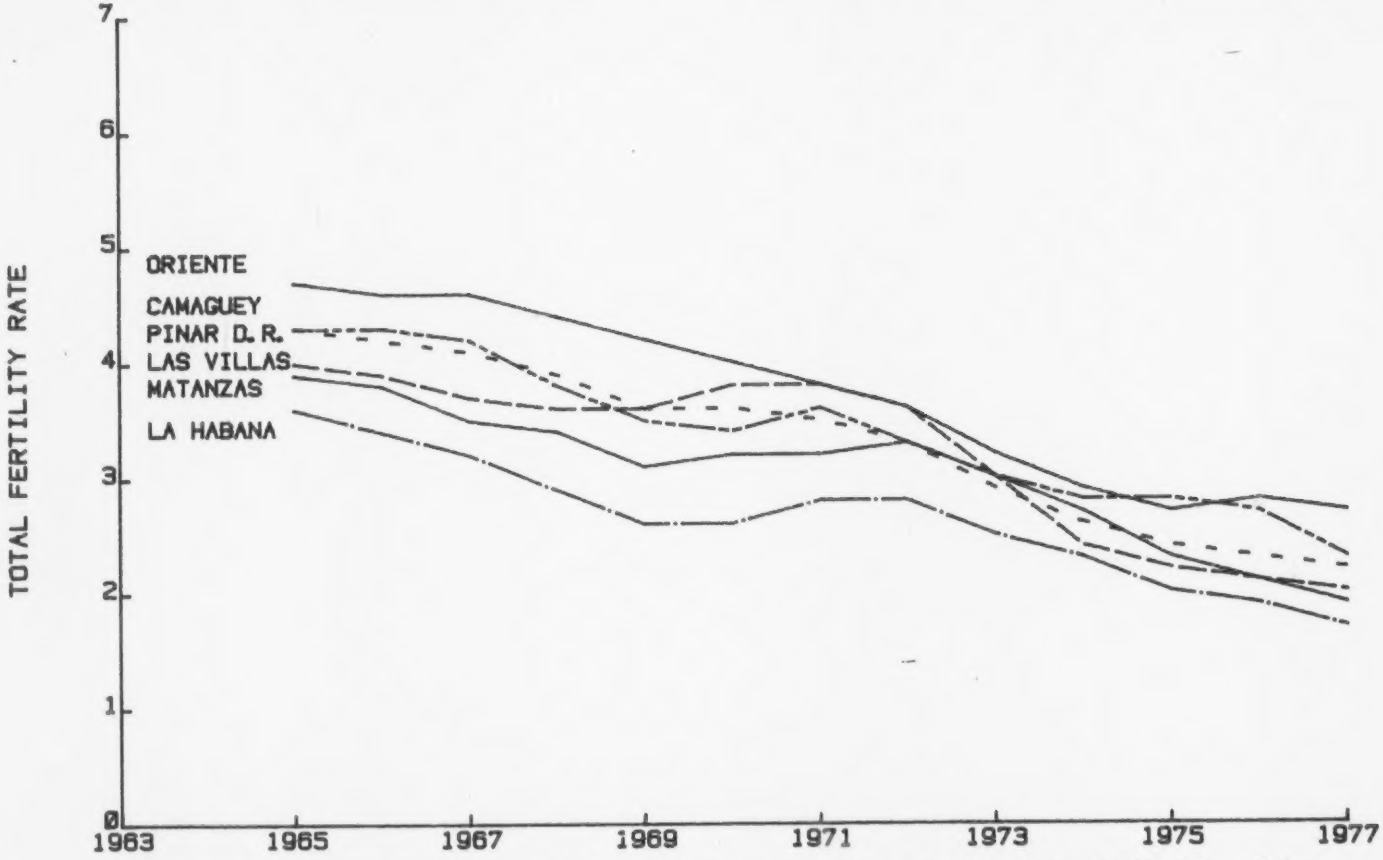


FIGURE 8 Total Fertility Rates, Urban Areas, Selected Years, 1965-77: Cuba

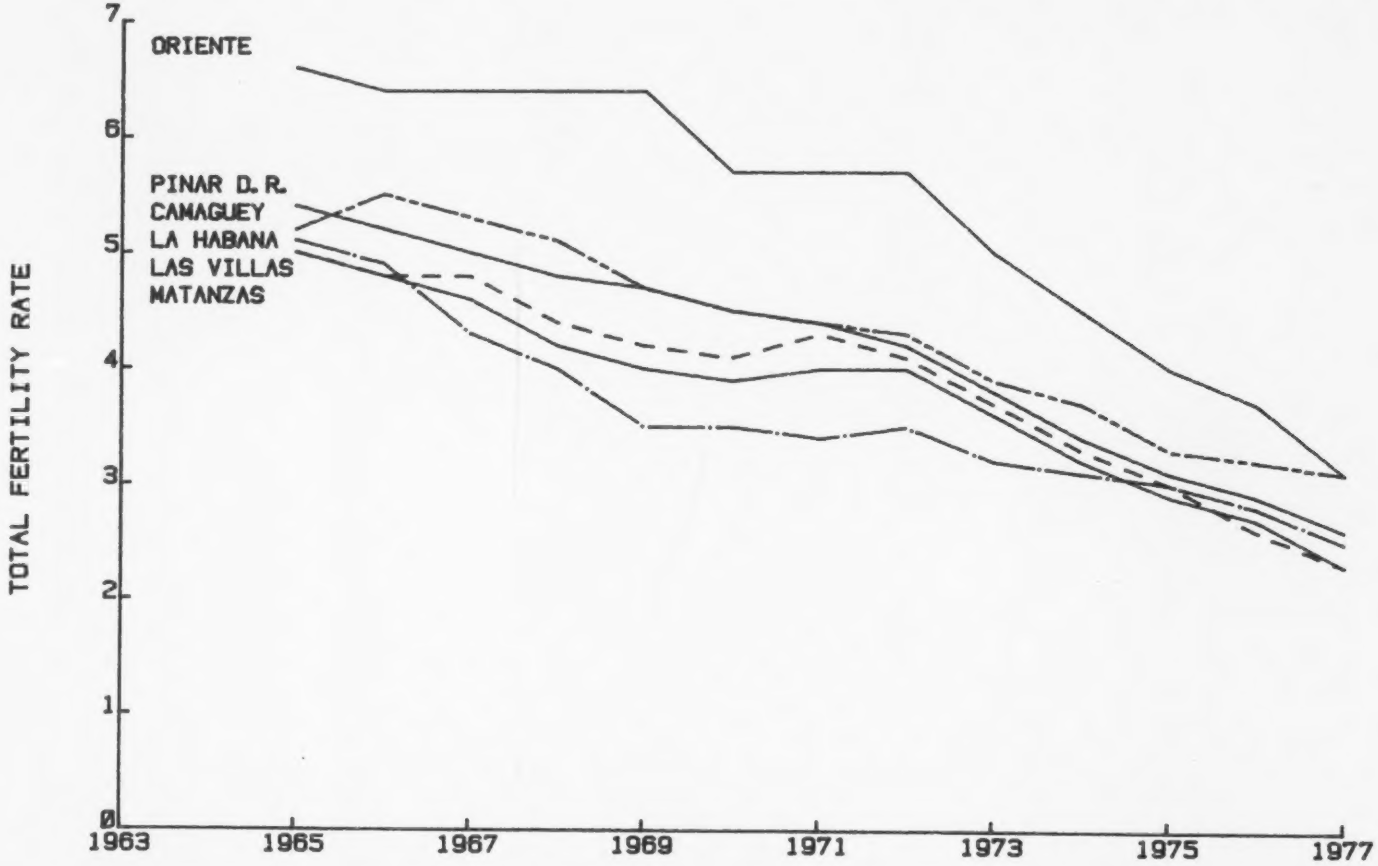


FIGURE 9 Total Fertility Rates, Rural Areas, Selected Years, 1965-77: Cuba

gathered from World Fertility Survey countries, although the two data sets are not strictly comparable (see note to Table 13). Coding problems in the Cuban data set and a possible misinterpretation of the question as related to spacing (see Footnote 7) may partially explain this discrepancy.[8] Questions on fertility desires for women of higher parity (one, two, and three) are more in line with the fertility desires of women in other low-fertility countries. For instance, among Cuban women with one surviving child, 43 percent stated that they did not want additional children, comparable to the proportions expressed in Japan and Czechoslovakia. Similarly, the proportions desiring no more children among women at parities two (86 percent) and three (93 percent) are similar to the proportions preferring no more children in low-fertility countries. On the other hand, in comparison to other Latin American countries with similar levels of economic development and educational attainment (Costa Rica, Panama), Cuban desires for additional children at parities zero, one, two, and three are much lower.[9]

When respondents are classified by age, as shown in Figure 10 and Table 14, nearly 42 percent of women less than 20 years of age with no surviving children declared that they did not desire additional children; this figure was 32 to 34 percent among women aged 20-24 and 25-29, and 42 percent among those aged 30-34. It is probable that a substantial proportion of young childless women intended to postpone the first birth rather than remain childless; as previously noted, this group included women with no response on fertility, and responses may have reflected spacing desires. Among women with surviving children, the desire for more is a function of the number surviving, which increases with the wife's age. For instance, among women aged 25-29 with one, two, or three living children, the proportions desiring no more children increase from 38 to 83 to 88 percent, respectively. Fertility desires are thus especially low among younger women: among those less than 20 years of age, for instance, 37 percent stated that they did not want additional children; among those who stated that they did want additional children, 59 percent desired only one, 33 percent two, and only 8 percent three.

Data on the average number of live births, surviving births, and number of additional children desired among women in union are classified by age group and educational attainment in Table 15. Except for women with incomplete primary education, there is relatively little difference

TABLE 12 Total Fertility Rates, by Present Provincial Division and Rural-Urban Residence, 1971-77: Cuba

	Births per 1,000 Women, Aged 15-49						
Province	1971	1972	1973	1974	1975	1976	1977
Pinar del Rio							
Total	4.0	3.8	3.3	3.0	2.8	2.6	2.4
Urban	3.4	3.4	2.7	2.7	2.4	2.3	2.2
Rural	4.3	4.3	3.9	3.2	3.1	3.0	2.5
La Habana							
Total	3.0	3.0	2.7	2.5	2.3	2.2	2.1
Urban	2.9	2.9	2.5	2.3	2.3	2.1	2.1
Rural	3.2	3.3	3.2	2.9	2.5	2.5	2.1
Ciudad de la Habana							
Total	3.1	3.1	2.7	2.4	2.2	2.1	1.9
Urban	3.1	3.1	2.7	2.4	2.2	2.1	1.9
Rural	--	--	--	--	--	--	--
Matanzas							
Total	3.5	3.5	2.9	2.5	2.4	2.3	2.0
Urban	3.2	3.2	3.2	2.6	2.2	2.1	2.0
Rural	4.0	4.0	3.9	2.9	2.9	2.9	2.2
Villa Clara							
Total	4.0	4.0	3.5	2.8	2.6	2.3	2.2
Urban	3.7	3.6	3.2	2.4	2.4	2.2	2.1
Rural	4.4	4.4	3.9	3.6	3.0	2.9	2.1
Cienfuegos							
Total	3.2	3.2	2.8	2.3	2.2	2.2	2.2
Urban	3.0	3.0	2.6	1.9	1.9	2.0	2.0
Rural	3.7	3.5	3.1	2.9	2.9	2.2	2.0
Sancti Spiritus							
Total	3.8	3.8	3.4	2.9	2.7	2.5	2.2
Urban	3.5	3.5	3.1	2.5	2.3	2.2	1.8
Rural	4.7	4.7	3.8	3.4	2.9	2.6	2.6
Ciego de Avila							
Total	3.6	3.5	3.2	2.9	2.9	2.8	2.3
Urban	3.3	3.3	2.7	2.6	2.5	2.5	2.1
Rural	3.9	3.9	3.8	3.5	3.3	3.2	2.8

TABLE 12 (continued)

	Births per 1,000 Women, 15-49						
Province	1971	1972	1973	1974	1975	1976	1977
Camaguey							
Total	3.9	3.8	3.2	3.1	2.8	2.8	2.5
Urban	3.7	3.5	2.8	2.8	2.8	2.8	2.3
Rural	4.6	4.6	4.3	4.0	3.8	3.1	2.8
Las Tunas							
Total	4.1	4.1	3.8	3.4	3.3	3.1	2.8
Urban	3.4	3.3	3.1	2.6	2.6	2.6	2.4
Rural	4.7	4.6	4.3	4.0	3.8	3.5	3.0
Holguin							
Total	5.3	4.8	4.4	3.7	3.4	3.3	2.7
Urban	4.2	4.1	3.7	2.9	2.9	2.7	2.4
Rural	6.4	5.5	5.1	4.7	3.9	3.8	3.0
Granma							
Total	5.1	4.8	4.2	3.6	3.6	3.3	2.6
Urban	3.8	3.4	3.2	2.9	2.9	2.6	2.3
Rural	6.2	5.9	5.6	5.3	4.5	3.8	2.9
Santiago de Cuba							
Total	5.2	5.0	4.5	4.0	3.6	3.3	2.6
Urban	4.4	4.0	3.3	3.1	3.1	2.8	2.3
Rural	6.8	6.4	6.3	5.1	4.8	4.1	3.1
Guantanamo							
Total	4.6	4.5	4.1	3.6	3.3	3.2	2.9
Urban	3.5	3.4	2.9	2.7	2.7	2.5	2.5
Rural	5.8	5.5	5.3	4.5	4.0	3.9	3.3

Note: Based on women aged 15-49.

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 10).

TABLE 13 Percent of Women Currently in Union Who Do Not Want Additional Children, by Number of Living Children, 1979: Cuba and Selected World Fertility Survey Countries

		Number of Living Children		
Country	No Children	One	Two	Three
Cuba	41.3	42.8	86.3	92.6
Colombia	9.0	19.0	52.0	65.0
Costa Rica	5.3	13.0	35.2	58.9
Dominican Republic	3.1	10.5	33.3	54.0
Jamaica	2.9	21.3	39.0	47.5
Mexico	9.8	10.0	42.4	53.5
Panama	7.7	12.0	42.0	72.6
Paraguay	1.4	4.9	21.1	31.0
Peru	6.3	19.9	48.2	62.2
Venezuela	8.9	10.0	41.1	64.1
Czechoslovakia	19.7	46.2	89.8	96.6
Japan	20.4	43.9	89.2	96.6 (3+)
Spain	8.7	28.5	65.1	77.8

Note: Data for Cuba refer to all women currently in union; for all other countries, the data refer to fecund women.

Sources: All countries except Cuba: World Fertility Survey First Country Reports (various years). For Cuba: Comite Estatal de Estadisticas (1981b:Table 26).

in fertility expectations (see Figure 11). To illustrate, among women aged 20-24 in union, mean expected family size is 2.0: 2.4 among those with incomplete primary education and ranging from 2.1 to 1.6 among those in higher educational categories. Among women aged 25-29 in union, the mean expected family size is 2.4: 3.1 among those with incomplete primary education and from 2.4 to 1.8 in higher educational groups.

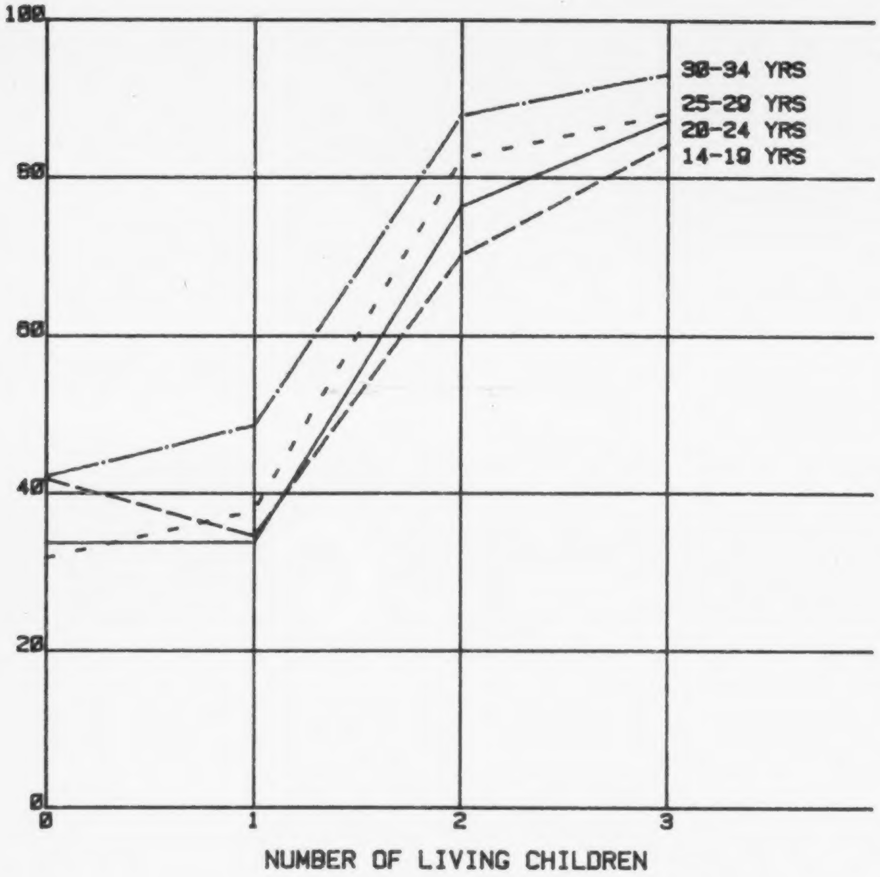


FIGURE 10 Percent of Currently Mated Women Who Want No More Children, by Number of Living Children and Age, 1979: Cuba

These low fertility expectations, especially among younger women, indicate that Cuba's current low fertility can be expected to continue, at least in the immediate future. Among women aged 15-19 in union, the mean expected family size was 1.5 children and about 2 children among women aged 20-24. In comparison, the total fertility rate at that time was 1.8. Among older women in union, aged 40-44, who were completing their childbearing, the mean number of children was much higher, approximately 3.8 children. Data on the fertility expectations of women in legal and consensual unions offer further support for these trends and are reviewed in the following chapter.

TABLE 14 Percent of Women Currently in Union Aged 14-34 Who Do Not Want Additional Children, by Number of Living Children, Age, and Rural-Urban Residence, 1979: Cuba

Number of Living Children and Age Group	Total	Urban Residence	Rural Residence
No Living Children			
14-19	41.8	39.9	44.4
20-24	33.7	33.4	34.7
25-29	31.8	29.5	39.3
30-34	42.1	39.8	48.8
One Living Child			
14-19	34.6	37.1	32.0
20-24	33.8	35.7	30.3
25-29	37.8	39.6	32.3
30-34	48.6	49.3	45.9
Two Living Children			
14-19	70.2	78.6	65.7
20-24	76.4	79.5	73.4
25-29	82.5	84.7	78.3
30-34	87.9	88.9	84.9
Three Living Children			
14-19	84.3	100.0	77.3
20-24	87.3	90.0	85.6
25-29	88.2	91.0	84.8
30-34	93.2	93.6	92.6

Source: Comite Estatal de Estadisticas (1981b:Table 27).

TABLE 15 Average Number of Live Births, Living Children, and Additional Children Desired Among Women in Union Aged 14-44, by Age and Educational Attainment, 1979: Cuba

Educational Attainment	Age Group					
	14-19	20-24	25-29	30-34	35-39	40-44
Number of Live Births per Woman						
Total[a]	0.57	1.37	2.10	2.85	3.43	3.92
Incomplete primary	0.91	2.00	2.87	3.61	4.04	4.46
Complete primary	0.67	1.57	2.16	2.66	3.05	3.25
Lower intermediate	0.44	1.13	1.74	2.20	2.49	2.58
Upper intermediate	0.29	0.80	1.35	1.89	2.08	2.26
University	0.06	0.39	0.94	1.48	1.50	1.95
Number of Living Children per Woman						
Total[a]	0.55	1.32	2.02	2.75	3.28	3.71
Incomplete primary	0.88	1.90	2.76	3.46	3.83	4.23
Complete primary	0.65	1.51	2.09	2.56	2.94	3.10
Lower intermediate	0.43	1.11	1.69	2.12	2.41	2.47
Upper intermediate	0.27	0.78	1.30	1.84	2.02	2.16
University	0.06	0.39	0.91	1.43	1.47	1.95
Additional Number of Children Desired						
Total[a]	0.96	0.66	0.41	0.23	0.16	0.08
Incomplete primary	0.90	0.53	0.30	0.17	0.14	0.07
Complete primary	1.07	0.58	0.35	0.21	0.15	0.07
Lower intermediate	0.91	0.69	0.44	0.26	0.20	0.13
Upper intermediate	1.02	0.83	0.58	0.36	0.24	0.12
University	1.02	1.21	0.86	0.50	0.50	0.10

[a] Incomplete primary includes women with no education. Lower and upper intermediate schooling and university schooling includes at least one year in the corresponding level.

Source: Comite Estatal de Estadisticas (1981b:Table 33).

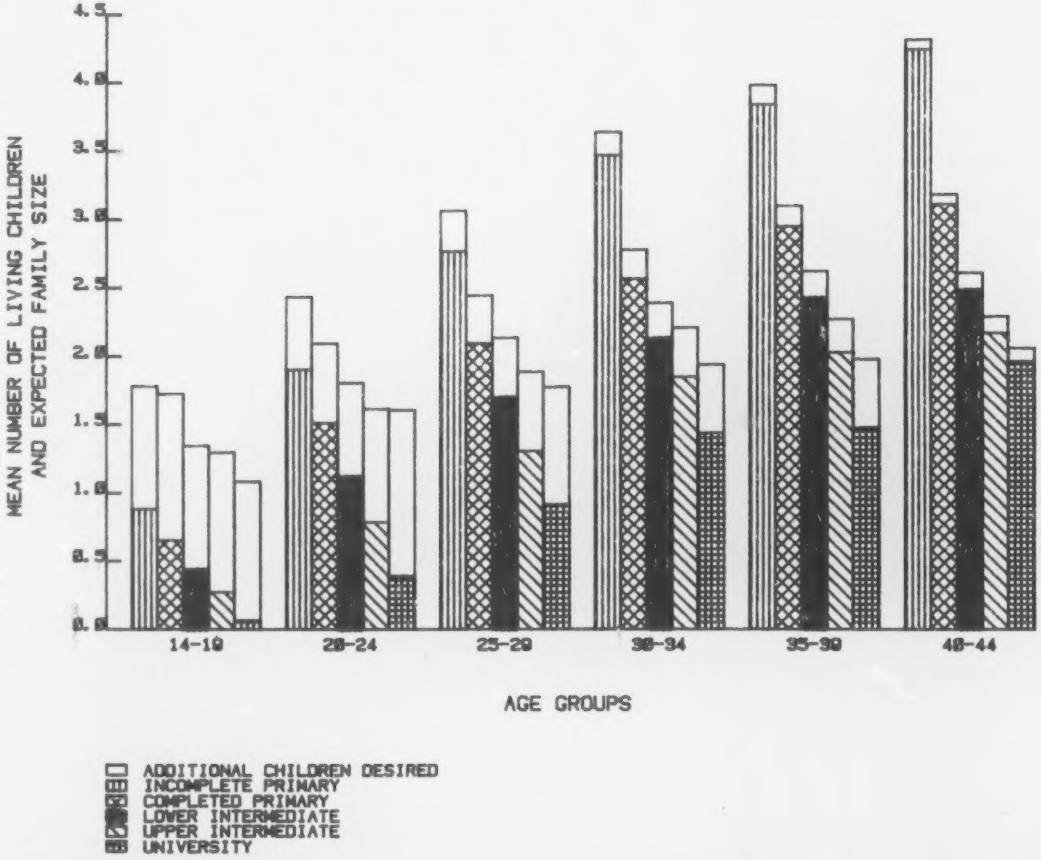


FIGURE 11 Mean Number of Living Children and Expected Family Size Among Women in Union Aged 14-44, by Educational Attainment, 1979: Cuba

CHAPTER 3

THE PROXIMATE DETERMINANTS OF FERTILITY

NUPTIALITY

Trends

Marital fertility is affected by a variety of factors relating to nuptiality: the average age at first union; and marital status, or the proportion of women in union, which is in turn influenced by the age composition of the population, as well as the incidence of widowhood, divorce, and remarriage. A distinctive feature of nuptiality in Latin America is the prevalence of consensual unions in addition to legal marriages through either civil or religious ceremonies. The consensual/legal distinction in Cuba is complicated by government campaigns, most active during 1960-61 and 1965, to formalize consensual unions through a series of laws termed _Operacion Familia_. Although the prevalence of consensual union declined somewhat during the 1970s, it remains a relatively popular practice. Legal marriage has also been weakened by laws liberalizing divorce, described in a later section, that have facilitated divorce and remarriage.

Data pertaining to Cuban age-specific marital fertility and socioeconomic differentials in age at marriage are lacking. Despite these limitations, trends in age at union and marital status can be ascertained from the censuses of 1953 and 1970, as well as from the 1979 National Demographic Survey and annual vital statistics on marriage rates. These data show the impact on fertility change of shifts in marital status and of government policies pertaining to marriage and divorce. Data on social characteristics and fertility differentials for women in consensual and legal unions are also available from the 1979 National Demographic Survey.

From 1953 to 1970, both the singulate mean age at marriage and the mean age at legal marriage declined, and total marriage rates rose. Trends in marital status for Cuban males and females aged 15-49 show a decline in the proportions single and an increase in the proportions in union. By 1979, the number of men and women of reproductive age had increased because of the aging of the baby boom cohort. However, during the 1970s, the singulate mean age at marriage rose, while the proportion of women of reproductive age in union declined. Trends in age at marriage and marital status are discussed in the subsections below.

Trends in Age at Marriage

The singulate mean age at marriage declined approximately 2.5 years between 1953 and 1970 for both males and females (Table 16). By 1970, the mean age at marriage was 23.4 years for males and 19.5 years for females. As shown in

TABLE 16 Current Marital Status and Singulate Mean Age at Marriage, by Sex, 1953, 1970, 1979: Cuba

	Female			Male		
Marital Status[a]	1953	1970	1979	1953	1970	1979
Single	30.4	22.2	19.6	42.5	34.9	31.7
Married	38.8	42.9	44.3	36.1	40.2	43.0
Consensual Union	21.3	23.0	19.1	18.2	20.9	18.7
Widowed	7.8	7.1	7.5	2.5	2.0	2.1
Separated	--	--	3.7	--	--	1.9
Divorced	1.7	4.8	5.8	0.7	2.0	2.7
Singulate Mean Age at Marriage[b]	22.0	19.5	20.2	26.0	23.4	23.9

[a] Population age 15 and above.

[b] Calculation based on 1953 and 1970 census data and 1979 National Demographic Survey data.

Sources: Republica de Cuba (1955:Table 30); Republica de Cuba (1975:Table 11); Comite Estatal de Estadisticas (1981c:Table 4).

Table 17, there were also declines in the mean age at time of legalization of union for both males and females from 1960 to 1971, the last year of published data. By 1971, the mean age at legal marriage was 26.1 years for women and 30.3 years for men. These figures include couples who were legalizing previous consensual unions and remarriages among those formerly divorced or widowed, as well as those entering a union for the first time.

The overall trend toward earlier marriage as of the early 1970s may be partially attributable to the redistribution of income; a decrease in the cost of living, especially in health, education, and housing; and increased economic security due to higher employment rates, which reduce the demand for economic self-sufficiency prior to marriage (JUCEPLAN, D.C.E., 1977). Data on economic status at the time of legalization of union for the 1960s show that nearly all men (95 to 97 percent) were employed at the time of legalization of union, although more detailed data on occupational status are not available. Access to coeducational boarding schools and the creation of mass organizations for political participation have also increased opportunities for socializing, thereby promoting earlier marriage. For instance, female students constituted 1.9 percent of the women legalizing unions in 1965, rising somewhat to 4.3 percent in 1971. Finally, as noted above, laws and government campaigns designed to promote the legalization of consensual union are also responsible for peaks in marriage rates (JUCEPLAN, D.C.E., 1977).[10]

Between 1970 and 1979, a trend toward postponement of unions was evident. The mean age at marriage, based on 1970 census data and the 1979 National Demographic Survey, increased .5 years, from 23.4 to 23.9, for males, and .7, from 19.5 to 20.2, for females. Differences in the mean age at marriage for men and women narrowed somewhat, from 4 years in 1953 to 3.9 years in 1970 and 3.7 years in 1979 (Table 16). This trend toward postponement of marriage in the late 1970s is probably attributable to the expansion of secondary education, the housing shortage in urban areas, and perhaps the increased availability of contraception. Other temporary contributory factors include compulsory military conscription for males, Cuban activities overseas, and the operation of a marriage squeeze, that is, a shortage of males aged 20-24 for females aged 15-19 due to the aging of the baby boom cohort. These various factors are discussed in detail below.

TABLE 17 Total and Ordinary Marriage Rates and Mean Age at Legal Marriage, 1955-80: Cuba

Year	Crude Total Marriage Rate[a]	Ordinary Marriage Rate[b]	Mean Legal Age at Marriage	
			Male	Female
1955	4.4	--	--	--
1956	4.4	--	30.5	25.4
1957	4.6	--	--	--
1958	4.5	--	--	--
1959	4.6	4.6	--	--
1960[c]	9.2	5.6	33.1	28.0
1961[c]	10.3	7.6	31.7	27.0
1962	8.3	7.1	30.3	25.9
1963	7.6	7.5	28.5	24.4
1964	6.1	6.0	29.1	25.0
1965[c]	8.9	6.6	31.2	26.7
1966	6.0	6.0	29.4	25.3
1967	6.4	6.3	29.8	25.7
1968	10.2	9.2	30.1	26.0
1969	10.2	9.7	29.6	25.5
1970	13.4	10.7	30.7	26.5
1971	13.0	11.3	30.3	26.1
1972	8.8	7.7	--	--
1973	7.0	6.1	--	--
1974	7.3	--	--	--
1975	7.0	--	--	--
1976	6.5	--	--	--
1977	6.5	--	--	--
1978	6.2	--	--	--
1979	6.7	--	--	--
1980	7.0	--	--	--

Note: -- indicates data unavailable.

[a] Number of marriages per 1,000 mid-year population. Figures include legal ordinary marriages and formalized consensual unions.
[b] Number of marriages, excluding formalization of consensual unions, per 1,000 mid-year population.
[c] Concerted governmental efforts to promote the legal formalization of consensual unions during these years.

Sources: 1955-71 figures: JUCEPLAN, D.C.E. (1977:Tables 1 and 3). 1972-75 figures: JUCEPLAN, D.C.E. (1975:Table 10); Comite Estatal de Estadisticas and CELADE (1981). 1976-80 figures: Comite Estatal de Estadisticas (1980:Table 46; 1982:Table 8).

Age at union has a clear relationship to fertility trends. The shifts in Cuban age at union described here underlie the trend toward earlier childbearing and an increase in age-specific fertility recorded among women aged 15-19 between the late 1950s and early 1970s, as well as the subsequent decline during the latter part of the decade.

Trends in Marital Status

Paralleling these shifts in age at marriage, the proportion of women in union shifted between the prerevolutionary and postrevolutionary period. Annual data on total marriage rates (including the legalization of consensual unions) are available for 1955-80, as shown in Table 17. Prior to the revolution, these rates were constant--approximately 4.5 marriages per 1,000 population from 1955 to 1958. The somewhat higher rates recorded for 1960-61 reflect the influence of Operacion Familia. Marriage rates doubled in the immediate postrevolutionary period and then declined slowly until 1968-71, when they again rose. Since 1972, total marriage rates, like fertility rates, have declined: by 1980, the marriage rate had declined to 7.0 per 1,000 population from levels higher than 13 in the early 1970s.

Data on ordinary marriage rates (excluding the legalization of consensual unions) show a pronounced increase during the immediate postrevolutionary years 1960-63 and a second peak from 1968 to 1971, although marriage rates for the years 1970-71 are somewhat inflated by higher rates of remarriage following divorce. Interestingly, these peaks in ordinary marriage rates are concomitant with periods of emigration from Cuba; the resulting increase in the housing supply encourages marriages postponed because of an inability to establish a separate household (see Figure 12). The peaks in marriage rates may also be partly attributable to marriages promoted by mass mobilizations of the population for the 1961 literacy campaign and the 1970 sugarcane harvest. During the 1961 literacy campaign, for instance, volunteers, primarily teenagers, were mobilized to teach literacy in the rural areas; similarly, mobilization of adult men and women for the 1970 sugarcane harvest (reportedly involving 150,000 to 235,000 volunteers) may account in part for the modest rise in fertility in 1971, representing a postponement of 1970 births.

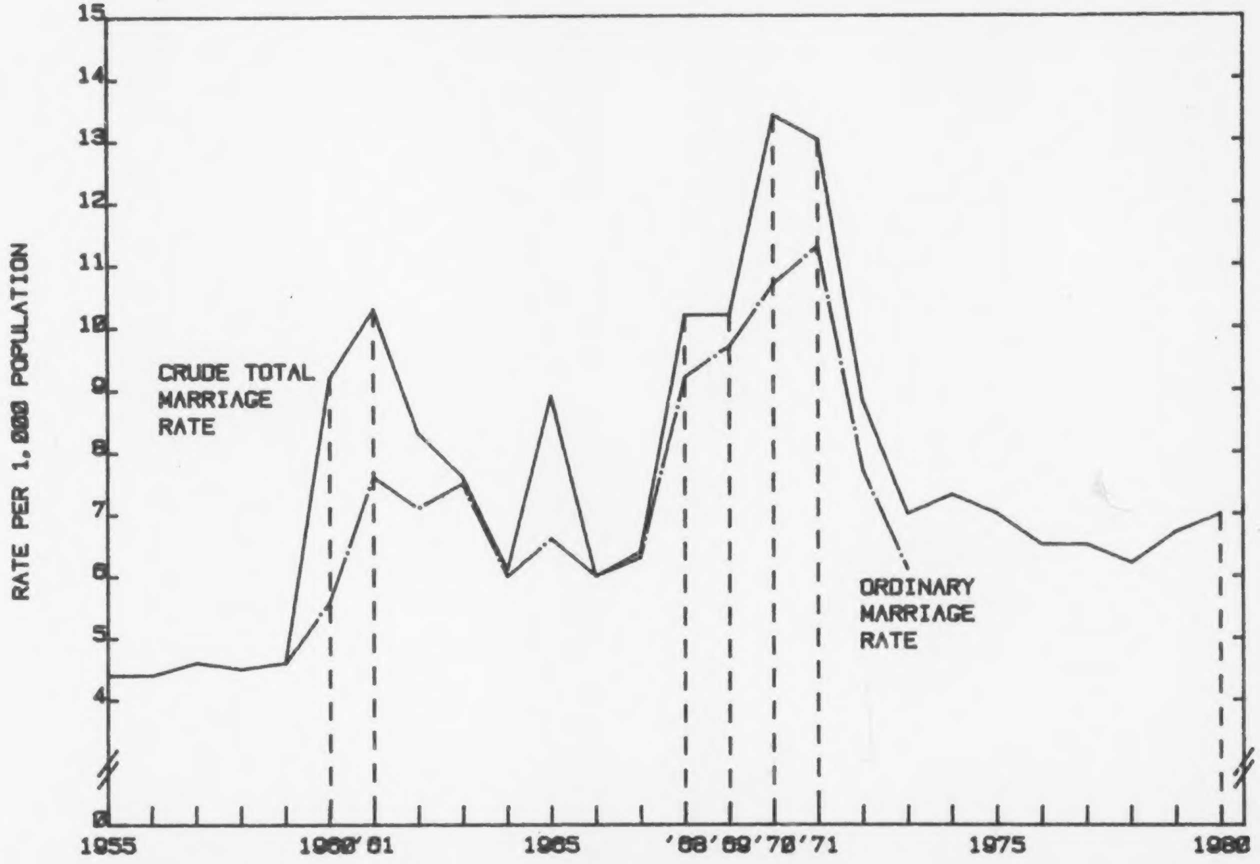


FIGURE 12 Marriage Rates and Peak Periods of Emigration, 1955-80: Cuba

TABLE 18 Age-Specific Total Marriage Rates, by Age of Mother and Year, 1956-71[a]: Cuba

	Age of Mother				
Year	15-19	20-24	25-29	30-34	35-39
1956	23.0	31.0	20.7	12.0	7.0
1960	38.9	57.9	40.4	30.9	23.2
1961	52.4	69.7	43.4	30.8	22.4
1962	50.5	58.0	33.0	21.8	15.8
1963	53.5	55.1	28.7	16.4	11.1
1964	43.3	41.9	24.5	14.7	10.1
1965	50.1	56.4	39.5	26.8	21.1
1966	40.1	41.4	24.4	15.2	11.0
1967	42.8	46.2	25.8	16.0	11.2
1968	65.4	73.3	43.3	27.7	21.1
1969	73.3	72.7	39.9	25.6	19.3
1970	88.1	87.5	53.8	39.7	31.2
1971	92.8	83.5	49.1	36.1	28.5

[a] Number of marriages per 1,000 mid-year female population in specific age groups. Figures include legal ordinary marriages and formalized consensual unions.

Source: JUCEPLAN, D.C.E. (1977:Table 9).

Age-specific total marriage rates for women 15-39, reported in Table 18, show an increase in the incidence of marriage within all age groups during the years of Operacion Familia (1960-61 and 1965). The second surge in marriage rates from 1968 to 1971 is similarly evident within all age groups. Especially marked, however, is the increase in marriage among women aged 15-19 and 20-24 underlying the trend toward earlier childbearing.

More detailed information on marital status by age group is provided for both men and women in Tables 16 and 19.[11] As noted in Table 16, between 1953 and 1970 the proportion of males age 15 and above living in union increased from 54 percent to 61 percent; the proportion for females increased from 60 percent to 66 percent. The proportion of widowed individuals declined slightly between 1953 and 1970, probably because of the dispropor-

TABLE 19 Marital Status Distribution, by Sex and Age Group, 1953, 1970, 1979: Cuba

	Female			Male		
Age Group	1953	1970	1979	1953	1970	1979
Proportions Single						
12-14	98.9	98.1	95.1	99.3	99.8	97.6
15-19	79.5	70.4	75.6	97.8	95.4	93.3
20-24	45.0	29.6	28.2	78.2	62.7	61.1
25-29	26.8	14.0	10.0	47.4	28.4	29.3
30-34	18.1	10.1	4.7	29.2	17.3	13.8
35-39	14.6	9.3	4.3	21.1	14.6	9.8
40-44	12.6	9.5	4.6	18.0	14.2	7.8
45-49	12.3	10.1	3.7	17.6	14.8	8.4
15-49	34.7	25.8	24.5	49.3	41.6	40.2
Proportions Married						
12-14	.5	.9	2.6	.5	.1	2.3
15-19	8.4	16.4	10.3	1.0	2.6	4.1
20-24	27.4	40.6	39.7	10.3	23.5	19.7
25-29	41.9	50.0	56.1	29.3	45.2	43.0
30-34	49.5	52.8	57.5	42.6	51.0	57.8
35-39	52.4	52.7	58.6	47.7	51.5	59.0
40-44	55.7	53.0	57.9	52.3	52.6	60.5
45-49	56.2	52.5	58.4	56.1	52.6	60.0
15-49	38.0	43.1	44.5	30.7	36.1	37.9
Proportions in Consensual Union						
12-14	.5	.9	1.8	.2	.1	.0
15-19	11.8	11.5	10.7	1.1	1.9	2.2
20-24	26.4	24.9	21.9	11.2	12.5	16.0
25-29	29.1	29.3	22.2	22.6	23.8	21.6
30-34	28.9	30.4	24.8	27.1	28.9	22.1
35-39	28.0	30.8	24.9	29.7	30.9	25.5
40-44	24.2	29.0	24.5	27.7	29.9	25.3
44-49	20.1	27.0	23.1	23.6	28.9	25.6
15-49	23.7	25.1	20.7	19.0	20.2	17.6

TABLE 19 (continued)

	Female			Male		
Age Group	1953	1970	1979	1953	1970	1979
Proportions Divorced and Separated						
12-14	.0	.1	.5	.0	.0	.1
15-19	.2	1.5	3.3	.0	.1	.3
20-24	.8	4.6	10.0	.2	1.2	3.1
25-29	1.6	6.2	11.3	.5	2.5	5.9
30-34	2.2	5.9	12.1	.7	2.6	6.1
35-39	2.6	5.8	11.0	.9	2.6	5.5
40-44	2.8	5.8	10.9	1.0	2.6	5.9
45-49	2.7	5.6	10.7	.9	2.7	5.2
15-49	1.6	4.8	9.3	.5	1.8	4.1
Proportions Widowed						
12-14	.1	.0	.0	.0	.0	.0
15-19	.1	.1	.0	.1	.0	.0
20-24	.3	.3	.2	.1	.1	.1
25-29	.6	.5	.4	.2	.1	.2
30-34	1.3	.8	.9	.4	.2	.2
35-39	2.4	1.5	1.3	.6	.4	.2
40-44	4.7	2.7	2.1	1.0	.6	.5
45-49	8.7	4.8	4.0	1.8	1.0	.8
15-49	2.0	1.2	1.0	.5	.3	.2

Sources: Republica de Cuba (1955:Table 30, 1975:Table 11); Comite Estatal de Estadisticas (1981c:Table 4).

tionate emigration of the elderly. A rise in the proportion of divorced and separated individuals is also evident, especially among women. Data on the population of reproductive age shown in Table 19 also reveal an increase in the proportion of males and females in union between 1953 and 1970 in part due to changes in reporting procedures and probable influence of the immigration of middle- and upper-middle class women from Cuba during the early 1960s. By 1970, 56 percent of all men and 68 percent of all women of reproductive age were in union. This increase is primarily attributable to a sharp increase in the proportions of married men and women aged 15-34, especially women aged 15-29; this is the same age group in which total marriage rates are highest. There was a less significant increase in the proportions living in consensual unions among those aged 35-49; among those aged 15-34, the proportions in consensual union changed little between 1953 and 1970.[12]

Between 1970 and 1979, as previously noted, the singulate mean age at marriage rose, and total marriage rates declined. Although the number of men and women entering reproductive age increased because of the aging of the baby boom cohort, the proportion of the population age 15 and above currently in union declined somewhat. As noted in Table 16, 63 percent of women and 62 percent of men aged 15 and above reported they were currently in union in 1979, in comparison to 66 percent of the women and 61 percent of the men in 1970. Table 19 shows that 65 percent of women and 56 percent of men aged 15-49 were in union in 1979. The proportions of men and women living in consensual union decreased in all age groups, while the proportions married increased among those aged 25-49. The proportion of women aged 15-19 who were single also increased.

An important component of the study of marriage status and fertility in Cuba is the type of union, consensual or legal. Data on the association between marital status and fertility are available through basic tabulations from the 1979 National Demographic Survey, which provide information on the mean number of live births, surviving births, and additional number of desired children among women aged 14-49 in consensual union or in legal marriage at the time of the survey.[13] It may be noted here that government efforts undertaken to encourage the formalization of consensual unions through Operacion Familia have had a small effect on the reduction of consensual unions over time perhaps due to the assumption by the state of many family functions. Despite these efforts, consensual union has remained popular, especially among older women. In 1979, 20.7 percent of all women aged 15-49 were in consensual union, in comparison to 23.7 percent in 1953 (Table 19). Among all women in union aged 15-49, 31.8 percent reported consensual unions in 1979, in comparison to 38.4 percent in 1953 (Table 22 below).

Although women of reproductive age living in consensual union have higher fertility than those in legal unions, this association is complicated by underlying relationships between marital status and place of residence, age at union, and educational attainment. The prevalence of consensual union is higher in rural than in urban areas:

TABLE 20 Educational Attainment of Women in Union Aged 14-49, by Current Marital Status, 1979: Cuba

		Marital Status	
Education	Total	Married	Consensual Union
Incomplete Primary	32.8	26.9	45.3
Complete Primary	26.4	27.6	23.8
Lower Intermediate	21.9	25.2	14.6
Upper Intermediate	10.3	13.6	3.1
University	3.3	3.3	.3
Unclassified	6.3	3.4	12.9

Source: Comite Estatal de Estadisticas (1981b:Table 17).

among women aged 14-49, nearly one-third of those in rural areas were living in consensual unions at the time of the National Demographic Survey, as compared to only 13 percent of those in urban areas. As shown in Table 20, nearly half of the women in consensual unions had not completed primary school, in comparison with one-fourth of those in legal unions. Moreover, like women in other Latin American nations, Cuban women begin consensual unions at younger ages than they do legal unions: as noted in Table 21, three-quarters of those living in consensual union in 1979 reported having begun their first union between the ages of 14 and 19, in contrast to 50 percent of those currently married and 55 percent of those who were widowed, divorced, or separated at the time of the survey.

Among women in union, 51 percent of those aged 15-19 reported living in consensual union, 36 percent of those aged 20-24, and 28-30 percent of those in older age groups up to age 49. Thus, the prevalence of consensual unions does not vary greatly among those over age 25, suggesting the possibility that consensual unions among these women are higher-order unions (Table 22). The data in Table 19 are arrayed differently; they show marital status distribution, including the proportions single, divorced, separated, and widowed in 1953, 1970, and 1979. In all three time periods, the prevalence of consensual unions shows little variation among women aged 20-49.

TABLE 21 Age at First Union for the Female Population Aged 14-49, by Current Marital Status, 1979: Cuba

Age at First Union or Marriage	Total	Current Marital Status		
		Married	Consensual Union	Widowed, Divorced, Separated
14-19	56.9	49.5	75.8	54.9
20-24	27.9	32.3	18.1	27.4
25-29	10.0	12.1	4.0	11.4
30-34	3.2	3.9	1.2	3.9
35-39	1.3	1.6	.6	1.5
40-44	.4	.5	.2	.6
45-49	.3	.3	.1	.3
Total	100.0	100.0	100.0	100.0

Source: Comite Estatal de Estadisticas (1981c:Table 12).

Table 23 and Figure 13 show that, according to the 1979 National Demographic Survey, women in consensual union have a higher mean number of surviving births than those in legal marriages, as well as higher fertility expectations. The latter, not assessed in a separate question, are calculated as the sum of the number of surviving births and the additional number of children desired by the respondent at the time of the survey. Expressed in terms of means, in urban areas, women in consensual union expected 3.4 children, as compared with 2.5 children expected by those in legal unions; the expectations of rural women in consensual and legal unions were similar (4.0 and 3.0, respectively). As shown graphically in Figure 13, within each age and marital-status group, women in rural areas have higher fertility than their urban counterparts. However, differentials in fertility and fertility expectations between women in consensual and legal unions widen as age increases, and are especially evident among older rural women; among younger women, differentials in fertility by marital status and urban-rural residence are not nearly as marked.

TABLE 22 Percent of Women in Consensual Union Among All Women in Union and Percent of Women Divorced and Separated Among All Unmated Women, by Age, 1953, 1970, 1979: Cuba

	Percent in Consensual Union Among Women in Union			Percent Divorced and Separated Among Unmated Women		
Age Group	1953	1970	1979	1953	1970	1979
15-19	58.3	41.2	51.0	.4	2.1	.5
20-24	49.1	38.0	35.6	2.6	13.4	8.7
25-29	41.0	36.9	28.4	8.3	29.8	27.0
30-34	36.8	36.6	30.1	17.2	34.9	33.3
35-39	34.8	36.9	29.8	26.1	35.0	32.0
40-44	30.3	35.4	29.7	37.4	32.3	33.7
45-49	26.3	34.0	28.3	47.4	27.5	27.0
15-49	38.4	36.9	31.8	11.2	15.2	11.8

Sources: Republica de Cuba (1955:Table 30; 1975:Table 11); Comite Estatal de Estadisticas (1981c:Table 4).

Another perspective on the association between marital status and fertility is offered in Table 24, which cross-classifies the mean number of live births and expected family size by marital status, place of residence, and women's educational attainment. These data, although not cross-classified by age group, show the expected negative relationships between educational attainment and both the number of live births and expected family size among urban and rural women living in consensual and legal unions. Within both urban and rural areas, differentials in fertility and expected family size between women in consensual and legal unions are greatest among those in the lowest educational category (incomplete primary), which includes 45 percent of women in consensual unions and 27 percent of those in legal unions. In urban areas, women living in consensual union with less than primary school completed expected 3.9 children, in comparison to 3.2 children expected by women in legal union; in rural areas, expected family size was 4.1 children among less-educated women in consensual unions, in contrast to 3.5 children among women in legal unions. Among women in other educational categories, fertility differences by marital status are negligible (see Figure 14).

TABLE 23 Mean Number of Live Births, Surviving Births, and Additional Children Desired, by Age, Current Marital Status, and Rural-Urban Residence, 1979: Cuba

Age Group	Current Marital Status						Difference: Consensual Union Minus Married		
	Consensual Union			Married					
	Live Births	Surviving Births	Additional Children Desired	Live Births	Surviving Births	Additional Children Desired	Live Births	Surviving Births	Additional Children Desired
Cuba									
14-19	.68	.65	1.04	.46	.45	.88	.22	.20	.16
20-24	1.70	1.63	.60	1.19	1.15	.70	.51	.48	-.10
25-29	2.80	2.68	.36	1.81	1.76	.43	.99	.92	-.07
30-34	3.81	3.64	.18	2.44	2.36	.25	1.37	1.28	-.07
35-39	4.69	4.44	.14	2.90	2.79	.17	1.79	1.65	-.03
40-44	5.35	5.00	.06	3.32	3.17	.09	2.03	1.83	-.03
45-49	5.85	5.41	--	3.46	3.29	--	2.39	2.12	--
14-49	3.52	3.32	.37	2.39	2.30	.35	1.13	1.02	.02
Urban Residence									
14-19	.56	.53	1.05	.44	.43	.90	.12	.10	.15
20-24	1.53	1.46	.62	1.05	1.02	.73	.48	.44	-.11
25-29	2.61	2.49	.35	1.69	1.64	.45	.92	.85	-.10
30-34	3.42	3.27	.27	2.28	2.20	.26	1.14	1.07	.01
35-39	4.18	3.94	.16	2.71	2.61	.18	1.47	1.33	-.02
40-44	4.58	4.24	.06	3.07	2.93	.09	1.51	1.31	-.03
45-49	4.99	4.59	--	3.11	2.96	--	1.88	2.13	--
14-49	3.20	3.01	.37	2.23	2.15	.36	.97	.86	.01

Rural Residence									
14-19	.75	.73	1.03	.50	.48	.84	.25	.25	.19
20-24	1.83	1.76	.58	1.49	1.43	.65	.33	.27	-.07
25-29	2.97	2.85	.37	2.14	2.06	.39	.83	.79	-.02
30-34	4.16	3.97	.16	2.90	2.81	.21	1.26	1.16	-.05
35-39	5.20	4.94	.11	3.44	3.31	.16	1.76	1.63	-.05
40-44	6.04	5.69	.05	4.05	3.86	.07	1.99	1.83	-.02
45-49	6.68	6.20	--	4.47	4.24	--	2.21	1.96	--
14-49	3.79	3.59	.38	2.82	2.71	.34	.97	.88	.04

Note: -- indicates question on the additional number of children desired was not asked of women aged 45-49.

Source: Comite Estatal de Estadisticas (1981b:Table 25).

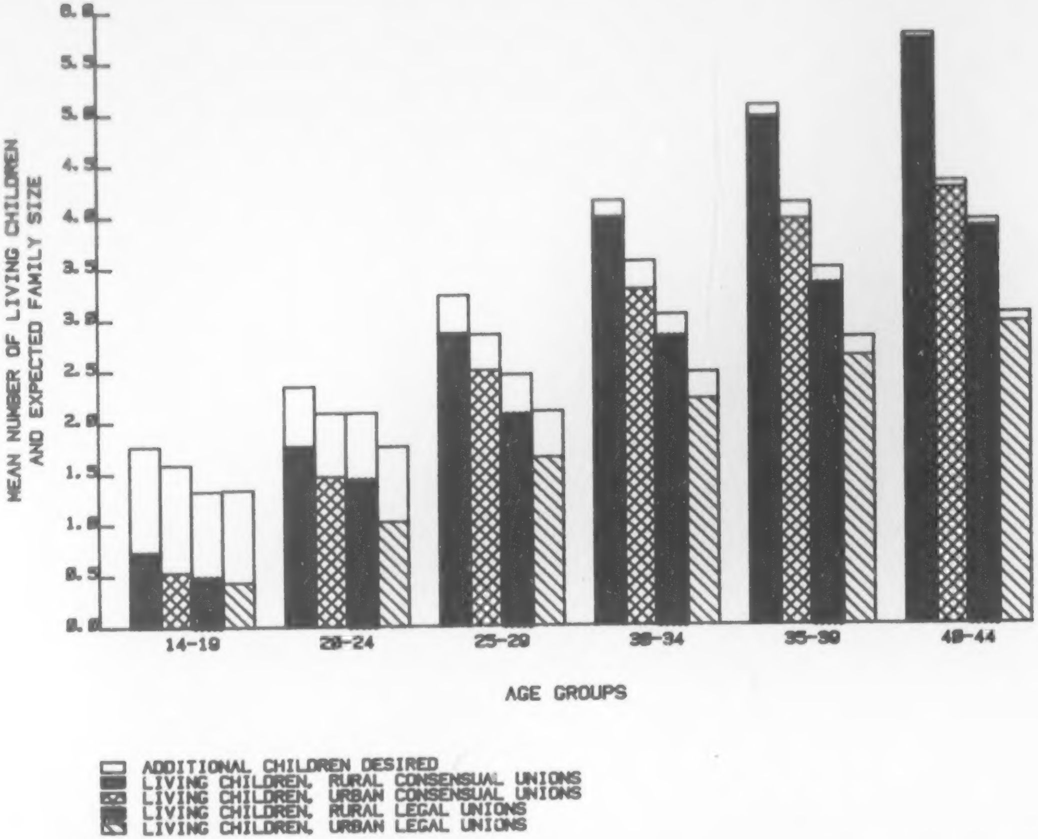


FIGURE 13 Mean Number of Living Children and Expected Family Size Among Women in Union Aged 14-44, by Current Marital Status and Ru[illegible]l-Urban Areas, 1979: Cuba

Divorce

As noted above, Cuban marriage rates doubled during the immediate postrevolutionary period, declined slowly until 1968, peaked in 1971, and subsequently declined. Similar trends can be seen in crude divorce rates, which rose from a prerevolutionary rate of .4 divorces per 1,000 population to a peak rate of 3.0 to 3.2 in 1971-72, with subsequent slight declines. As of 1980, the divorce rate was 2.5 (Table 25).

More precise data on divorce are presented in Tables 16, 19, and 22, which show an increase in the proportion of divorced and separated women between 1953 and 1970 and further increases between 1970 and 1979. For instance, among men and women of reproductive age, the proportions of women currently divorced and separated increased from 1.6 percent in 1953 to 4.8 percent in 1970 to 9.3 percent in 1979; for men, the increase recorded was from .5 percent in 1953 to 1.8 percent in 1970 and 4.1 percent in 1979 (Table 19). Table 22 examines the proportion among all unmated women (including those single and widowed) who were divorced or separated for 1953, 1970, and 1979. In 1953, this proportion increased by age group; by 1979, however, there was a shift toward higher divorce among younger women and relatively little difference in prevalence among women aged 25-49.

The rise in postrevolutionary divorce rates is attributable to rapid social change, the increased economic independence of women, the deleterious impact of the housing shortage, and liberalization of divorce legislation. Under the divorce statute of the Family Code Legislation, enacted in 1975, either party may take action to obtain a divorce through judicial decree on rather unrestricted grounds, that is, when the marriage has lost its meaning for the couple and their children, and thus for society as a whole (Ministry of Justice, 1975).

In general, in postrevolutionary Cuba, both marriage and divorce are more likely, and remarriage is less probable, particularly among women. Counterbalancing the higher divorce rate has been a reduction in the proportion of single women in all age groups. Nearly all Cuban women enter a union at some time during their reproductive years. As noted in Table 19, in 1979 the proportion of those single among older women ranged from 4.6 among those aged 40-44 to 3.7 percent among those aged 45-49; in contrast, in 1953, the proportions of single women

TABLE 24 Mean Number of Live Births and Expected Family Size Among Women in Union Aged 14-49, by Marital Status, Educational Attainment, and Rural-Urban Residence, 1979: Cuba

	Current Marital Status				Difference: Consensual Union Minus Married	
	Consensual Union		Married			
Education	Live Births	Expected Family Size[a]	Live Births	Expected Family Size[a]	Live Births	Expected Family Size[a]
Cuba						
Incomplete primary	4.00	4.02	3.31	3.33	.69	.69
Completed primary	2.68	2.95	2.44	2.60	.24	.35
Lower intermediate	1.72	2.27	1.72	2.07	.00	.20
Upper intermediate	1.38	2.06	1.49	1.92	-.11	.14
University	1.51	2.02	1.15	1.80	.36	.22
Total[b]	3.52	3.66	2.39	2.61	1.13	1.05
Urban Residence						
Incomplete primary	3.91	3.87	3.24	3.23	.67	.64
Completed primary	2.83	2.99	2.48	2.59	.35	.40
Lower intermediate	1.82	2.30	1.74	2.07	.08	.23
Upper intermediate	1.38	2.04	1.50	1.92	-.12	.12
University	1.56	2.03	1.15	1.80	.41	.23
Total[b]	3.20	3.33	2.23	2.46	.97	.87

Rural Residence						
Incomplete primary	4.06	4.12	3.40	3.45	.66	.67
Completed primary	2.52	2.92	2.36	2.61	.16	.31
Lower intermediate	1.54	2.20	1.58	2.05	-.04	.15
Upper intermediate	1.37	2.09	1.40	1.93	-.03	.16
University	.59	1.82	1.08	1.88	-.49	-.06
Total[1]	3.79	3.93	2.82	3.01	.97	.92

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[a] Expected family size is defined as the sum of the number of surviving births plus the additional number of children desired by the respondent at the time of the interview. Question on the additional number of children desired was not asked of women aged 45-49.

[b] Total figures include women with undeclared educational attainment. Those categorized as having incomplete primary education include women with no education. Lower intermediate, upper intermediate, and university education include women with at least one year of education in the corresponding educational levels.

Source: Comite Estatal de Estadisticas (1981b:Table 32).

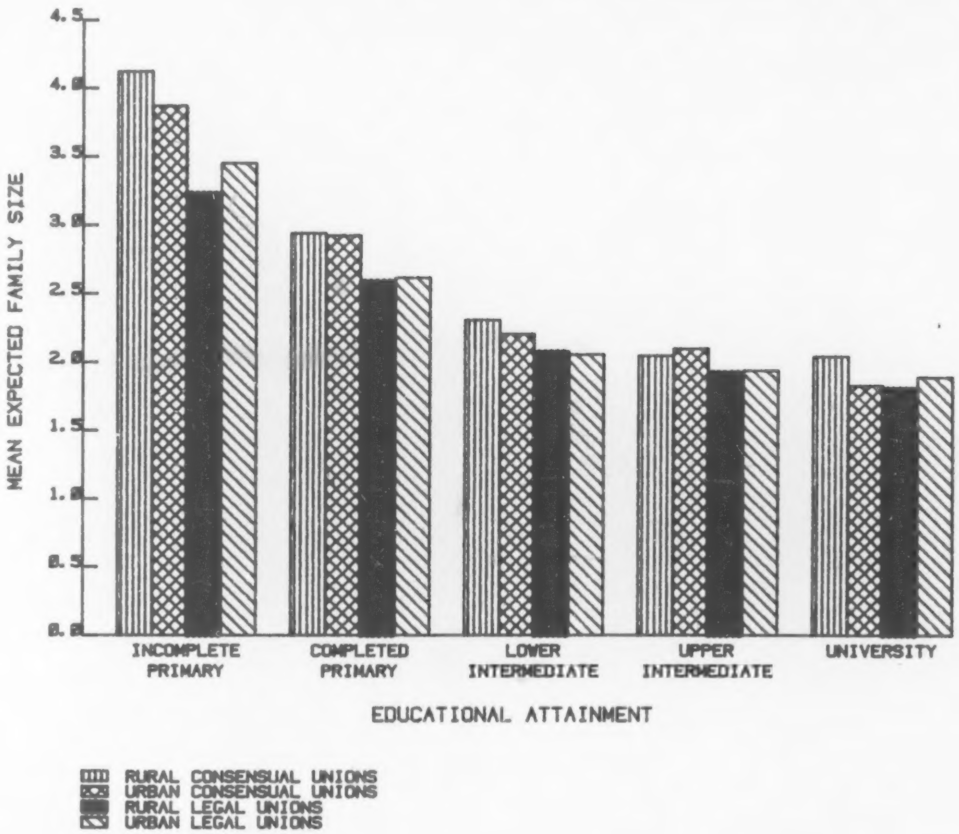


FIGURE 14 Mean Expected Family Size Among Women in Union Aged 14-44, by Current Marital Status, Educational Attainment, and Rural-Urban Areas, 1979: Cuba

TABLE 25 Crude Divorce Rates[a], 1955-80: Cuba

Year	Crude Divorce Rate	Year	Crude Divorce Rate
1955	.4	1968	1.8
1956	.4	1969	2.4
1957	.4	1970	2.9
1958	.4	1971	3.2
1959	.4	1972	2.9
1960	.5	1973	2.7
1961	.6	1974	2.2
1962	.8	1975	2.4
1963	1.0	1976	2.3
1964	1.0	1977	2.4
1965	1.1	1978	2.6
1966	1.2	1979	2.6
1967	1.4	1980	2.5

[a] Number of divorces per 1,000 mid-year population.

Sources: 1955-71 figures: JUCEPLAN, D.C.E. (1977:Table 1). 1972-75 figures: JUCEPLAN, D.C.E. (1975:Table 10); Comite Estatal de Estadisticas and CELADE (1981). 1976-80 figures: Comite Estatal de Estadisticas (1980:Table 46; 1982:Table 8).

were much higher--12.6 percent among those aged 40-44 and 12.3 percent among those aged 45-49. Rates of remarriage among ever-divorced men and women aged 15-49 show that men are far more likely than women to remarry. Although the prevalence of divorce increased within every age group between 1953 and 1979, the proportions currently divorced are higher among women than among men in all age groups, suggesting a lower probability of remarriage among women.

The mean age at first divorce among women declined from 29.5 years in 1964 to 27.8 years in 1971; for men, there was a decline from 34.6 to 31.7 (JUCEPLAN, D.C.E., 1976). Although there are no published data available on parity of couples at the time of divorce, it appears that the rising divorce rate has not been an important factor

TABLE 26 Percent of Childless, Divorced Couples, by Marital Duration and Year of Divorce, 1962-63 and 1969-71: Cuba

Marital Duration	1962	1963	1969	1970	1971
0-6 months	78.7	77.2	87.8	92.1	92.2
6-11 months	78.9	77.9	87.7	88.1	87.5
1 year	66.5	64.5	64.0	65.0	64.1
2 years	48.0	42.0	44.3	41.0	39.6
3 years	42.5	36.5	30.3	28.4	29.4
4 years	35.8	39.6	25.2	25.7	25.0
5 years	36.5	29.5	18.6	20.5	21.2
6 years	36.3	33.2	18.0	16.5	16.8
7 years	26.8	27.4	16.8	15.3	17.0
8 years	27.0	25.1	15.1	12.5	14.3
9 years	22.7	23.3	15.9	13.8	13.7
10-14 years	23.0	23.6	18.1	15.7	14.6
15-19 years	22.0	21.6	21.6	14.8	16.3
20+ years	23.3	22.1	26.4	21.7	23.0

Source: JUCEPLAN, D.C.E. (1976:Table 19).

in fertility decline. Table 26 provides some data on the proportion of childless couples among individuals granted divorces in selected years from 1962-71. These data suggest that childlessness among couples requesting divorce after less than a year of marriage was more frequent in the early 1970s (when divorce rates were highest) than in the early 1960s. Comparing these two periods, among couples married 2 or more years who subsequently divorced, there is a reduction in the proportion childless, indicating that children were less of an obstacle to divorce in the early 1970s than in the early 1960s (JUCEPLAN, D.C.E., 1976). No later data have been published that would indicate the association between divorce and number of children during the later 1970s, following enactment of the 1975 Family Code.[14]

The Effect of Cohort Size on Nuptiality

As noted earlier, data on marital status by sex and age for Cuba between 1953 and 1979 show shifts in the proportion of men and women in union, especially among the younger cohorts. The changing size of successive cohorts and differences in the mean age at marriage for males and females appear to have produced a marriage squeeze that is probably associated with shifts in female marital status between 1970 and 1979 and with the rapid fertility decline recorded in the late 1970s. This is especially true for younger women aged 15-19 and 20-24 who experienced sharp declines in age-specific fertility rates between 1976 and 1980 (37 percent and 35 percent, respectively). Estimated singulate mean ages at marriage for males and females in Cuba, obtained from the latest available 1970 census data, differ by about 4 years (19.5 years of age for females and 23.4 years for males). It is therefore possible to determine roughly whether differences in the size of the successive cohorts produced by the baby boom of the early 1960s have produced a marriage squeeze. This has been done, based on age-sex estimates of the Cuban population, through a comparison of the sex ratios derived from relating the male population in five-year age groups to the female population in the preceding five-year age groups during the prime marriage ages (15-29 for females).

The results of these computations, with the estimated age structures for 1970, 1975, and 1980, are shown in Table 27. As the table shows, the earlier trends in these sex ratios with increasing age are consistent with what might be expected given the conventional tapering off with age of a population pyramid (see Figure 3) and higher male mortality since birth. By 1980, however, the sex ratio for women aged 15-19 and men aged 20-24 deviates significantly from the expected pattern: at these ages, there are only approximately 72 men for every 100 women. The 1980 sex ratio obtained by relating women aged 15-24 to men 20-29 also reflects this sex imbalance.

Table 28 provides additional data on sex ratios of males 20-24 per 100 females 15-19, by province, using the latest available 1979 data. As noted in the table, sex ratios recorded in the provinces are low but do not differ greatly from the 1979 national average (70.4), ranging from a low of 64 males 20-24 per 100 females 15-19 in Ciudad de la Habana to a high of 77 males in Holguin. The only exception is noted in Isla de la Juventud, an island off the southwest coast of Cuba used for the education of Cuban and international scholarship students from Africa and Central America, ranging in age from 12 to 18: in 1979, Isla de la Juventud had an extremely high sex ratio of 156.

TABLE 27 Sex Ratios of the Population in Prime Marriage Ages, 1970-90: Cuba

All Marital Statuses	1970	1975	1979	1980	1985	1990
Males 20-24/Females 15-19	96.8	97.5		71.5	100.3	112.4
Males 25-29/Females 20-24	93.3	96.4		97.2	70.4	100.1
Males 30-34/Females 25-29	89.7	92.5		96.9	98.2	70.1
Males 20-29/Females 15-24	95.1	97.0		82.0	85.7	106.0
Males 20-29/Females 15-24 with adjustments for assumed number of males serving abroad temporarily[a]	--	--		77.7	--	--
Single, Divorced, Separated, and Widowed						
Males 20-24/Females 15-19	84.9		57.2			
Males 25-29/Females 20-24	83.6		91.4			
Males 30-34/Females 25-29	87.1		88.3			
Males 20-29/Females 15-24	84.5		65.5			

[a] Assumed to be 40,000 and all in ages 20-29.

Sources: For all marital statuses: Comite Estatal de Estadisticas and CELADE (1980b:Table 9). For single, divorced, separated, and widowed: Republica de Cuba (1975:Table 11); Comite Estatal de Estadisticas (1981c:Table 4).

The bottom panel of Table 27 illustrates an alternative measure of the marriage squeeze: the ratio of unmarried men of marriage age to unmarried women of marriage age, based on marital status distributions from the 1970 census and the 1979 National Demographic Survey. Ratios below unity indicate an increase in unmarried women (single, divorced, separated, and widowed). There is relatively little difference in the sex ratios in 1970 among the various age groups. By 1979, however, there is a sharp decline to 57 unmarried males aged 20-24 per 100 unmarried females aged 15-19; the 1979 sex ratio obtained by relating unmarried females aged 15-24 to unmarried males 20-29 also reflects this sex imbalance.

TABLE 28 Sex Ratios by Provincial Division for all Ages and for Prime Marriage Ages, 1979: Cuba

	Birth Rate	All Ages	All Males 20-24/ Females 15-19	Unmarried Males 20-24/ Females 15-19	All Males 20-29/ Females 15-24	Unmarried Males 20-29/Unmarried Females 15-24
Cuba	14.7	103.6	70.4	57.2	84.1	65.5
Pinar del Rio	16.6	108.2	72.8	63.1	87.7	71.9
La Habana	12.8	106.0	70.0	59.5	86.1	69.8
Ciudad de la Habana	11.4	94.8	64.4	50.9	81.1	62.2
Matanzas	12.6	105.7	68.5	62.0	86.7	70.2
Villa Clara	13.1	104.7	66.2	51.8	83.1	61.3
Cienfuegos	13.9	105.5	67.1	66.0	83.3	76.6
Sancti Spiritus	12.7	106.9	70.6	63.5	85.6	71.5
Ciego de Avila	15.5	109.8	73.7	61.1	87.5	71.5
Camaguey	15.4	106.9	68.5	53.1	84.6	63.3
Las Tunas	16.6	108.5	76.7	48.3	89.0	56.6
Holguin	15.4	105.7	74.6	63.6	85.7	68.6
Granma	18.5	105.6	73.4	57.1	81.0	64.4
Santiago de Cuba	17.2	102.7	74.5	61.3	82.9	65.4
Guantanamo	19.7	105.2	75.9	60.3	81.5	62.7
Isla de la Juventud	19.7	110.5	156.3	59.0	99.4	62.1

Sources: For all marital statuses: Comite Estatal de Estadisticas (1980:Tables 20 and 9). For single, divorced, widowed, and separated: Comite Estatal de Estadisticas (1981c:Table 4).

Table 28 illustrates this second measure of the marriage squeeze by province, indicating a range in sex ratios from a low of 48 in the eastern province of Las Tunas to 66 in the central province of Cienfuegos. With the exception of these two provinces, there is little variation from the ratio calculated for all of Cuba (57 unmarried males 20-24 per 100 females 15-19). Provincial ratios of unmarried males 20-29 per 100 unmarried females 15-24 show even less variation around the national ratio of 66.

Disentangling the associations between nuptiality and the marriage squeeze, increased availability of contraception, and higher rates of female enrollment in secondary schools is impossible. However, the long-term effect of the marriage squeeze on the proportions never married is likely to be small. As previously reported, the proportion of single never-married females in Cuba among older cohorts has declined considerably since 1953, while the proportion of divorced women has increased. Moreover, given the subsequent decline in Cuban fertility since 1965, the current marriage squeeze will only be temporary, to be replaced by a marriage squeeze for men in 1990. The sex ratios for 1985 and 1990, appearing in Table 27, are based on projections of the Cuban population (medium estimate).[15] These projections show a reversal in sex ratios beginning in 1985. By 1985, the ratio of marriage-age men (20-24) to marriage-age women (15-19) reaches unity. By 1990, the ratio of males 20-24 to females 15-19 increases to 112, indicating a shortage of young women for men. The 1990 sex ratio obtained by relating women 15-24 to men 20-29 also reflects this sex imbalance.

The Effect of Emigration on Nuptiality and Fertility

As noted above, over the last 20 years, Cuba has experienced sizable emigration. Between January 1, 1959 and September 30, 1980, 793,856 Cubans are known to have entered the United States permanently; perhaps as many as 100,000 Cubans may have settled in other countries during the same period (Diaz-Briquets and Perez, 1981). Tables 29 and 30 provide data on Cubans admitted permanently to the United States from 1959 to 1980, official Cuban data on net international migration (immigrants minus emigrants), and sex ratios among the emigres. The loss of nearly 800,000 Cubans entering the United States between 1959 and 1980 represents approximately 8 percent of the

TABLE 29 Number of Cubans Arriving in the United States[a], 1959-80

Year	Number of Arrivals	Year	Number of Arrivals
1959	26,527	1970	49,545
1960	60,224	1971	50,001
1961	49,961	1972	23,977
1962	78,611	1973	12,597
1963	42,929	1974	13,670
1964	15,616	1975	8,488
1965	16,447	1976	4,515
1966	46,688	1977	4,548
1967	52,147	1978	4,108
1968	55,945	1979	2,644
1969	52,625	1980	122,061
Total (1/1/59 to 9/30/80)			793,856
Total (4/1/80 to 12/31/80)			125,118

[a] For 1959, January 1 through June 30 only; from 1960 through 1976, year ending June 30; from 1977 through 1980, year ending September 30.

Source: U.S. Department of Justice (1980, 1981).

country's population in 1981. Official Cuban figures shown in Table 30, indicate a net loss of nearly 600,000 persons between 1959 and 1979 (see also Appendix 2). These estimates would be even higher if descendants of emigrants who were born and reside abroad were also included.16

The impact of this large-scale emigration on fertility and nuptiality can be crudely assessed by examining sex ratios within Cuba and among the Cuban-born population in the United States. As noted in Table 4, throughout this century, successive Cuban censuses have recorded extremely high sex ratios, the result of a history of heavy, largely

TABLE 30 Net International Migration, Sex Ratios Among Emigrants, and Correlation Coefficients Between Provincial Nuptiality and Emigration Rates, 1959-79: Cuba

Year	Immigrants Minus Emigrants[a]	Sex Ratios All Emigrants	Sex Ratios Emigrants Aged 15-49	Correlation Coefficients
1959	12,345	--	--	--
1960	-62,379	35.6	5.6	--
1961	-67,468	74.9	58.9	--
1962	-66,264	87.2	78.3	--
1963	-12,201	77.1	64.9	--
1964	-12,791	96.1	93.8	--
1965	-18,003	102.7	102.4	--
1966	-53,409	79.3	66.3	--
1967	-51,972	87.9	81.8	--
1968	-56,755	--	--	--
1969	-49,776	--	--	--
1970	-56,404	85.2	74.3	.35
1971	-49,631	110.8	116.7	.51
1972	-16,856	427.9	518.2	.36
1973	- 7,073	522.1	655.3	.22
1974	- 3,893	480.2	573.6	.36
1975	- 2,891	438.4	527.9	-.05
1976	- 2,891	82.3	83.8	-.23
1977	- 968	67.5	59.2	-.23
1978[b]	- 3,462	108.9	113.6	.19
1979[b]	-16,270	114.4	122.7	.12

Note: -- indicates data unavailable. Correlations computed for years with available data.

[a] Official estimates. The totals may underestimate the extent of net international migration because of unauthorized exits.

[b] Sex ratios in 1978 and 1979 appearing in the third column pertain to the age group 14-64.

Sources: Comite Estatal de Estadisticas (1980:Tables 68 and 69). For provincial nuptiality and emigration rates, see Comite Estatal de Estadisticas (1978, 1979:Table 8).

male-dominated immigration during the first quarter of this century. These high sex ratios can still be detected in the 1970 census (105.2) and less so in the 1981 census (102.4), following the 1980 Mariel sealift. Sex ratios by age for 1970, shown in Table 31, are especially high after age 60, exceeding 105 males per 100 females for the total population. There is some evidence suggesting that the historical tendency toward high sex ratios was reinforced during the 1960s, when females outnumbered males in the emigration stream because the government prevented

TABLE 31 Sex Ratios by Age of Cubans and Cuban-Born Population in the United States, 1970

Age Group	Cuba	Cuban-Born Population in the United States	Reconstructed Sex Ratios
0-4	104.7	102.8	104.7
5-9	104.6	110.4	104.8
10-14	105.2	100.9	105.0
15-19	103.3	98.0	103.1
20-24	102.5	80.2	101.6
25-29	103.8	72.4	102.2
30-34	104.5	85.0	103.0
35-39	101.8	93.0	101.0
40-44	101.7	94.3	101.0
45-49	104.5	96.1	103.7
50-54	107.1	92.1	105.9
55-59	106.2	80.4	104.1
60-64	116.4	78.8	113.3
65-69	125.8	79.7	122.5
70-74	128.9	60.1	122.7
75-79	107.8	55.1[a]	98.3[a]
80-84	101.0		
85+	91.0		
All Ages	105.2	89.0	104.3[b]

[a] Aged 75 and over.

[b] The total reconstructed sex ratio has not been adjusted for emigration, since these effects are minor.

Sources: For Cuba: Comite Estatal de Estadisticas (1980:Table 2). For Cuban-born population in the United States: Bureau of the Census (1973:71).

the emigration of healthy males of military age. During the early 1970s, male emigrants outnumbered females; however, the total number of emigrants was considerably reduced below the levels of the 1960s (Table 30).

Between the 1953 and 1970 censuses, the sex ratio for Cuba increased slightly from 105.0 to 105.2. Data on the Cuban-born population in the United States shown in the third column of Table 31 support this observation: in 1970, there were only 89 men for every 100 women in the U.S. Cuban-born population; among the age group 20-34, the ratios were much lower than would have been anticipated (a range of 72 to 85 males per 100 females). A preponderance of males in the large emigration outflow from Cuba to the United States in 1980 will result in a greater similarity between the sex ratios of these age groups among the Cuban and U.S. Cuban-born populations.

It could be hypothesized that in the absence of sex-imbalanced emigration, the fertility rise in the 1960s would have been even more pronounced since the imbalance was concentrated in the peak years of family formation. The data available to test this proposition are extremely limited. However, it is unlikely that this imbalance has significantly affected fertility. As the fourth column of Table 31 shows, there is some change in the reconstructed sex ratios of the Cuban population in 1970 derived from combining by age the 1970 Cuban and U.S. Cuban-born populations. However, this does not suggest that the absence of emigration would have significantly changed the sex ratios of the population of childbearing age.

Though the difference would not have been significant, fertility during the 1960s might have been somewhat lower had the emigres remained, given their characteristically low fertility. In 1970, according to the measures computed from that year's census data, the fertility level of Cuban women in the United States was about three-quarters that of the total U.S population and far below that of other Spanish-origin groups. To illustrate, among the Cuban-born population there were 312.5 children under age 5 per 1,000 women aged 15-44, compared to 404.2 for the total U.S. population.

Greater detail on the fertility of Cuban-Americans is provided in recent analyses from 1970 U.S. census data undertaken by Jaffe et al. (1980). According to these analyses, the number of children ever born to Cuban women aged 15-44 was 1.3 per woman as of 1970. Among women aged 33-44 in 1970 (among whom 78 percent were currently married with spouse present), the average number of children ever born alive per woman (and thus completed fertility) varied from 1.9 children among women with 12 or more years of education to 2.0 children among those with less than 12 years of education. In comparison, the average number of children ever born per woman was much higher among women aged 33-44 years in the non-Spanish white population: 2.7 children among women with 12 or more years of education and 3.1 children among those with less than 12 years of education.

The fertility of Cuban emigrants is likely to remain low. In a survey of later arrivals conducted by Portes et al. (1977) in the early 1970s, the majority of respondents revealed aspirations of upward mobility, scored fairly high on a modernity index, and had the highest labor force participation rate of all Spanish-origin women in the U.S., orientations which tend to reinforce lower fertility.

The Effect of Civilian and Military Overseas Activities on Nuptiality

The sex imbalance at the prime marriage ages described above becomes more marked when allowance is made for the temporary emigration of young Cuban males known to be involved in civilian and military activities in other countries. The potential impact of this involvement has not been examined in depth. It has obviously led to the temporary but at times prolonged separation of otherwise cohabitating couples, and has removed from the country a sizable number of people, mainly males, in the prime marriage ages.

The numbers involved are substantial, and their departure has coincided with the period of rapid fertility decline and rapid expansion of the population aged 15-19, the ages for entry into military service and the labor force. Cuban involvement in Africa began in 1975 with the arrival of Cuban troops in Angola and has continued with similar activities in Ethiopia since 1977. It is believed that by 1978, Cuba had approximately 38,650 military technicians and combat troops in these two nations and other African and Middle Eastern countries (Mesa-Lago, 1981). In addition, thousands of technicians, health personnel, and teachers have served in other countries. It is likely that by 1980, the total number of Cuban civilian and military personnel abroad, mainly young males, may have grown to 50,000 or 60,000 (Diaz-Briquets and Perez, 1981; Latin American Weekly Report, August 1, 1980). Roca (1980a:60) provides the following estimation:

> Cuba had from 47,000 to 49,000 military and civilian personnel on the African continent in 1978 and 1979, or about 1.5 percent of the total labor force in 1978; 44,500 were stationed in Angola and Ethiopia that year (in addition, some 3,000 to

> 5,000 Cubans were fulfilling internationalist missions in Asia, the Middle East, and Latin America with large numbers of civilian technicians being sent to Nicaragua after July 1979).

By 1981, however, Castro had reported a sizable increase of nearly 15,000 civilian workers in 36 countries, including 1,196 physicians, 2,264 other health workers, 3,562 teachers, and approximately 7,000 construction workers (Castro, 1981:13-14, 20). This level of involvement abroad compares, in relative terms, to that of the United States in Vietnam during the peak years of that conflict. Intensifying the nation's imbalanced sex ratios, this involvement could be expected to have a dampening effect on fertility, principally through the direct mechanisms of family formation: females have fewer potential spouses within the requisite age groups; higher divorce rates and lower probability of remarriage among women might be expected; and, in the case of temporary emigration, postponement of marriage and separation of otherwise cohabitating couples result. As noted previously in Table 27, the sex ratio of males 20-29 per 100 females 15-24 in 1980 (82) is reduced to 78 after adjustment for 40,000 males aged 20-29 serving abroad temporarily. This can at least partly explain the sharp decline in age-specific fertility rates, particularly among women aged 15-19. It can be anticipated that the sex ratio imbalances for some age groups will further intensify during the 1980s since males from urban areas were heavily overrepresented in the 1980 Mariel sealift, during which 125,000 Cubans emigrated.

It should be noted, however, that emigration has also had a less significant pronatalist effect. Given Cuba's housing shortage, emigration appears to be related to nuptiality and fertility. The antinatalist effect of the housing shortage, to be discussed in detail below, results from postponement of marriage or childbearing because of an inability to establish a separate nuclear household or because of overcrowded housing conditions. Figure 12 shows the close correspondence observed between emigration and the marriage rate during the last two decades. The last column of Table 30 illustrates the correlation coefficients found in relating provincial emigration and nuptiality rates.[17] Although these correlations are not high, they are generally in the expected direction: higher during periods of heavy emigration and low, in some cases with a negative sign, during periods of low emigration. Since the housing shortage is more acute in urban areas and emigrants are predominantly urban in origin, the increased availability of housing will affect nuptiality and household formation predominantly in urban areas.

In conclusion, it does not appear that large-scale emigration during the 1960s had a significant effect on fertility since most emigrants came from social classes with lower fertility. Cuban military and civilian activities abroad, however, would appear to have had some dampening effect on nuptiality and fertility through postponement of marriage and separation of otherwise cohabitating couples. These activities further distort Cuban sex ratios, especially among younger cohorts, who are already experiencing a marriage squeeze due to the effect of the baby boom of the 1960s. Sex ratios and therefore nuptiality and fertility in the coming decade will also be affected by the 1980 Mariel sealift, in which young men were heavily overrepresented.

Decomposition of Change in Birth Rates, 1970-79

As noted above, the period 1970-79 was characterized by rapid fertility decline, the reduction and stabilization of total marriage rates, a slight decline in the proportion of women in union, and a temporary marriage squeeze affecting younger cohorts of women, traceable to the impact of the aging of the baby boom cohort and to Cuban overseas activities.

The extent to which changes in marital fertility and proportions of women in reproductive union contributed to the 1970-79 fertility decline is discussed in this section through application of the standardization technique described in The Methodology of Measuring the Impact of Family Planning Programs on Fertility (United Nations, 1979). The data used in the decomposition were obtained from the 1970 Cuban census, the 1979 National Demographic Survey, estimates of the 1979 age structure, and official estimates of age-specific fertility rates. For both dates, the proportions of currently, legally married women were combined with the proportions of women currently in consensual unions to derive an overall estimate of currently "married" women. The decomposition was calculated for both the general fertility rate and the crude birth rate.

TABLE 32 Decomposition of Change in the General Fertility Rate, 1970-79: Cuba

Component	Absolute Change	Relative Change (percent)
GFR, base year (1970)	121.2	--
GFR, end year (1979)	59.2	--
Observed change (per 1,000)	-62.0	--
Reproductive age structure	- 3.25	-4.65
Marital status distribution	-11.24	-16.07
Marital fertility	-52.10	-74.53
Interaction	4.59	-4.75

According to the estimates for the decomposition of the general fertility rate (Table 32), nearly 75 percent of the overall fertility decline can be attributed to reductions in marital fertility and a less significant proportion to changes in the marital status distribution, that is, a decline in the proportion of women in reproductive unions (16 percent). A further minor contribution was made by changes in reproductive age structure. Decomposing change in the crude birth rate (Table 33) produces a basically similar pattern. Over the period in question, the birth rate declined by 13 points, from 27.6 to 14.6. About 90 percent of this decline resulted from changes in marital fertility and a smaller proportion (20 percent) from a decline in the proportion of women in reproductive unions. Counteracting these tendencies to a small degree was an increase in the number of women in reproductive ages, a consequence of the arrival at these ages of the cohorts born during the early years of the 1960s baby boom.

In summary, the decomposition estimates corroborate that most of the fertility decline during the 1970s was produced by changes in marital fertility. Another important but less significant factor was a reduction in the proportion of women in reproductive unions. This reduction apparently reflects the lower marriage rates during

TABLE 33 Decomposition of Change in the Crude Birth Rate, 1970-79: Cuba

Component	Absolute Change	Relative Change (percent)
CBR, base year (1970)	27.6	--
CBR, end year (1979)	14.6	--
Observed change (per 1,000)	-13.0	--
Number of women of reproductive age	+1.14	+8.8
Reproductive age structure	-.74	-5.7
Marital status distribution	-2.56	-19.8
Marital fertility	-11.86	-91.6
Interaction	-1.02	+8.3

the 1970s, a rise in the proportion of divorced women, and the possible impact of the marriage squeeze.

BREASTFEEDING PATTERNS

Breastfeeding is nearly universal in Cuba, although the median age at weaning is early, between two and three months. The mean duration of breastfeeding and differentials in duration cannot be assessed precisely from the available data--a 1973 survey of 4,272 children representing 99.4 percent of the children surviving at 7 days from a cohort of children born during the first week of March 1973 (single births only). These data, gathered as part of the national investigation of perinatal mortality, pertain to the first 7 months only (Moreno and Rubi, 1979).[18]

As noted in Table 34, among the 4,228 surviving infants, only 4.6 percent had never been breastfed. At age 7 days, 90 percent were fully or partially breastfed, with a supplement of other milk products. A gradual

TABLE 34 Percent of Children Breastfed Partially or Fully, No Longer Breastfed, and Percent Terminating Breastfeeding During the Interval, by Age of Child, Perinatal Mortality Investigation, 1973: Cuba

Duration of Breastfeeding	Percent of Children Still Breastfed at End of Period[a]	Percent of Children No Longer Breastfed at End of Period	Percent Ceasing Breastfeeding During Interval
1 day	95.4	4.6	--
7 days	89.8	10.2	5.6
1 month	72.2	27.8	17.6
2 months	57.0	43.0	15.2
3 months	45.2	54.8	11.8
4 months	39.9	60.1	5.3
5 months	35.7	64.3	4.2
6 months	33.1	66.9	2.6
7 months	32.3	67.7	0.8

[a] Partial breastfeeding includes breast milk supplemented by other milk products.

Source: Moreno and Rubi (1979:Figure 2).

TABLE 35 Primary Reasons for Weaning, Perinatal Mortality Investigation, 1973: Cuba[a]

Maternal Factors		Child-Related Factors	
Insufficient milk	80.6	Milk was not filling	64.6
Poor quality milk	5.8	Child disliked milk	12.4
Pregnancy	1.8	Produced diarrhea	11.1
Work outside home	1.7	Medical indication	5.0
Work inside home	0.2	Insufficient weight gain	3.3
Aesthetic reasons	0.0	Other illness	1.4
Other, unspecified	9.9	Other, unspecified	2.2
Total	100.0	Total	100.0
Number	(2,278)	Number	(1,750)

[a] The total number of reasons (4,028) exceeds the number of children who were no longer breastfeeding at the end of 7 months (2,862) since more than one reason could be offered by the respondent.

Source: Moreno and Rubi (1979:Table 1).

decline in the proportion breastfed, more accentuated in the earlier months of life, followed. The median age at weaning was between 2 and 3 months, with weaning commonly accompanied by supplementation with artificial milk products (infant formula, sweetened condensed milk). At age 7 months, only one-third of the children were still partially or fully breastfed. Although breastfeeding history data on the proportions fully breastfed were not gathered by month, this proportion was only 10 percent at age 7 months. Length of breastfeeding was negatively associated with the incidence of acute diarrheal disease and hospitalization for all illnesses.

As noted in Table 35, the principal reasons for weaning offered by mothers included insufficient milk, inability to satisfy the infant's appetite, or the child's dislike for breastmilk. However, these stated reasons were not reflected in the actual records of weight gain in infants. Other reasons, more appropriately medical (diarrhea, medical indication, insufficient weight gain, other illness), comprised one-fifth of the child-related factors cited for cessation of breastfeeding. Female employment and aesthetic reasons, such as concern with physical appearance, were not major factors associated with weaning. Only 12 percent of the mothers were employed.

Among the nonemployed, one-third were still breastfeeding their infants at age 7 months. Women normally employed outside the home were less likely to breastfeed for this length of time: among those with maternity leave, 19 percent were still breastfeeding at 7 months as compared to 23 percent of those without maternity leave who did not intend to return to the labor force. The shorter duration of breastfeeding among employed women may be due to an underlying association with education. Although no tabulations are presented on the duration of breastfeeding by women's educational attainment, mothers with higher education introduced other foods into the diet at an earlier age, and their infants' diets at age 7 months were more varied.[19] Mother's education was positively associated with lower infant mortality, better food supplementation, higher concurrence with regularly scheduled postpartum infant care appointments, and more frequent use of medical services for illnesses and emergencies, as well as hospitalizations.

The effect of breastfeeding on fertility in Cuba appears to be minor. For purposes of the decomposition of the proximate determinants of fertility described below, the truncated breastfeeding data were simply extrapolated, allowing a 2-percent decline in the proportion of children breastfed for every 1-month period beyond 7 months until about age 2. The mean duration of breastfeeding, calculated in this manner, was 6 months. The final impact of the index of postpartum infecundability on Cuban fertility in the early 1970s was far less significant than that of other intermediate variables (proportions married, contraceptive prevalence, and induced abortion); in comparison to other countries with similar levels of fertility, postpartum infecundability was a less significant factor modifying fertility. Given the importance of breastfeeding for the protection of infant health, however, and the relatively short duration of breastfeeding among Cuban women, the Department of Health Education is developing programs for pharmacists, booklets for distribution at pharmacies, and audiovisual materials directed especially at rural audiences to encourage breastfeeding.

FERTILITY REGULATION

Governmental Policies Related to Fertility Regulation

Cuban Population Policy

Cuba's official population policy was defined at the 1974 Bucharest World Population Conference:

> Cuba is of the opinion that free access to effective contraception and other means of fertility control should be guaranteed to the entire population; however, we maintain that a policy of population and family planning can only be defined as a function of a general plan of economic and social development.

Population growth is currently thought to be compatible with the nation's economic development strategies. The government has maintained that an integrated process of socioeconomic development, involving sustained economic growth, income redistribution, and full employment, obviates the need for a policy aimed specifically at reducing population growth (United Nations and UNFPA, 1979).

Although Cuba has no specific targets for fertility reduction, the government has established a variety of objectives related to fertility regulation. Briefly summarized, these include the following: reduction of the frequency of abortion and repeat abortion; prevention of high-risk pregnancies; improved quality of maternal/child health/family planning services through the use of more effective contraceptives and increased coverage to reduce regional availability differences; and prevention of the transmission of genetically determined illness (UNFPA, 1982b). In addition, government goals have been established for infant and maternal mortality, as noted in Table 36, which reports official mortality figures based on death registration data, rather than mortality estimates based on census and survey data. As previously discussed, the analysis of census and survey data largely confirms the general level of the infant mortality rates based on registered deaths for the 1960s and early 1970s, but indicates higher infant mortality for the mid-1970s and late 1970s. Nevertheless, according to the official figures, targets for infant and child mortality reduction have largely been met, and substantial progress has been

TABLE 36 Infant and Maternal Mortality Rates and Long-Term Objectives for Maternal and Child Mortality, 1970-82: Cuba

				Long-Term Objectives	
Mortality Measure[a]	1970	1975	1978	1978	1982
Perinatal mortality	33.0	26.5	22.9	24.0	24.0
Late fetal mortality	15.3	11.7	10.7	12.0	12.0
Early neonatal mortality	17.7	14.8	12.2	12.0	10.0
Neonatal mortality	23.8	17.4	14.5	14.0	12.0
Postneonatal mortality	15.0	10.1	7.8	6.0	8.0
Infant mortality	38.8	27.5	22.3	20.0	20.0
Maternal mortality[b]	70.5	68.4	45.2	20.9	40.0

[a] Rates per 1,000 live births except where indicated.
[b] Rates per 100,000 live births.

Sources: 1970 figures: Ministerio de Salud Publica de Cuba (1979). 1975-82 figures: INFPA (1982a).

made in efforts to reduce maternal mortality through the expansion of health services. In turn, these efforts have indirectly reduced fertility through efforts to prevent high-risk pregnancy among older, multiparous women.

Policies Designed to Provide Access to Abortion and Contraception

The rapid decline in Cuban fertility has been promoted by government policies designed to provide equal access to legal abortion and contraception. No freestanding family planning programs exist; rather, fertility regulation has been integrated into the Cuban system of socialized medicine as part of the maternal and child care program, which has received the highest priority in the national health program. The spread of services within rural areas and educational efforts on fertility regulation through polyclinics and mass organizations have been major factors accounting for fertility decline in Cuba and reduction in interprovincial fertility differentials since the mid-1960s. Cuban women have free access to legal abortion performed by physicians in hospitals to reduce both the negative effects of high fertility on maternal health and reliance on unsafe illegal abortion. Since the mid-1970s, the government has also increased the availability of contraceptive services in polyclinics, hospitals, and national pharmacies to reduce the incidence of repeat abortion and to improve maternal and child health through spacing. Results of the decomposition of the proximate determinants of fertility for the early 1970s indicate that contraception is Cuba's major method of fertility regulation, with abortion as a secondary factor.

Abortion Laws pertaining to abortion in Cuba date back to the Spanish Penal Code of 1870, later incorporated into the Cuban Penal Code of 1879 and the Social Defense Code of April 1936. According to the latter, abortion was highly restricted legally and prohibited except on grounds of grave danger to the woman's life or health, on juridical grounds (pregnancy following rape or abduction without marriage), or on eugenic grounds (anticipated physical or mental impairment). The conditions constituting high risk to a woman's health were not defined by the law, however, and merely required the concurrence of two physicians. Thus, abortion was available in large urban areas, especially in Havana, where physicians charged moderate fees according to the social class of their patients.

From 1959-64, however, the antiabortion law was more strictly observed. The emigration of private physicians in the early revolutionary period (officially reported but perhaps overestimated as 2,000-3,000 of the previously existing 6,300 physicians) increased the difficulty and cost of obtaining an abortion; this resulted in greater reliance on unskilled practitioners and a rise in maternal mortality. During this period, moreover, Cuba's contraceptive practice lagged behind that of some other Latin American countries, and a shortage of contraceptive supplies also developed following the economic blockade. As a result, the incidence of illegal abortion increased; between 1962 and 1965, clandestine abortion accounted for nearly one-third of all maternal deaths (other causes included traumatic births and infections). Therefore, in late 1964, the Social Defense Code was amended to make the conditions for abortion more flexible: the World Health Organization definition of health was adopted--"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1970). These criteria, which became the medical norms for termination of pregnancy established by the Ministry of Public Health, have resulted in greater access to abortion since 1965 through the national public health system.

Most abortions are performed in provincial maternity hospitals and general medical-surgical hospitals by vacuum aspiration or surgical curettage. Abortions up to 12 weeks of gestation are performed solely at the woman's request for single women 18 years of age and older and married women, and consent of the partner is not required. Single women under the age of 18 require parental permission for an abortion according to the norms of the Ministry of Public Health. However, in reality such approval is not always necessary. Abortions after 12 weeks are also performed, but require validation by the director of the institution and approval by the obstetrician-gynecologist, which is usually forthcoming. National data on the incidence of second-trimester abortion are unavailable. A recent study conducted in a Havana gynecology and obstetrics hospital reported that repeat abortions constituted 1.5 to 12 percent of all induced abortions (Valdes Vivo et al., 1978). Small-scale studies of women requesting hospital abortions have estimated a higher incidence of repeat abortion, ranging from 28 to 58 percent among the women sampled currently requesting abortion (Gonzalez Perez, n.d.).

Under the new penal code of November 1, 1979, which covers all laws, not only those relating to abortion and health, punishment has been established for illegal abortions (loss of physician's license and imprisonment). Illegal abortions are defined as those performed without the permission of the woman, for profit, outside hospitals, or against the regulations established by the Ministry of Public Health. This new penal code reflects a change in law but not in practice since the age and gestation guidelines pertaining to the provision of abortion remain unchanged. Additional norms regarding appropriate abortion techniques and length of hospital stay will also be established in the near future.

Abortion is not perceived as the most desirable form of fertility regulation. Since abortion is not without risk, it is viewed as an emergency solution for unwanted pregnancy, which can be avoided through preventive contraception. Since abortions cannot be eliminated by law, the government has elected to make them safe, and, since the mid-1970s, to try to replace abortion with contraception.

Contraception Contraception was not emphasized by the Cuban government until the mid-1970s because of the priority assigned to other needs within the health system and a shortage of contraceptive supplies. Although modern contraceptive methods were available in Cuba during the early 1960s, their quantities were limited. Contraception was provided in public health facilities on request or upon recommendation by physicians following abortion. Intrauterine devices (IUDs), manufactured within Cuba or purchased from countries in Eastern Europe, were most frequently used; in 1971, it was reported that eight polyclinics and five hospitals in Havana averaged a total of 4,700 IUD insertions per month (Chelala, 1971). Sterilization was used primarily by older women 35 and over.

The provision of contraceptive service was given impetus in 1974, when the Cuban government signed an agreement with the United Nations Fund for Population Activities (UNFPA) during the World Population Conference in Bucharest. This agreement included the provision of some $384,000 for contraceptive materials, primarily for local manufacture of oral contraceptives and distribution of IUDs in a total 1975-78 budget of $3,861,000. Although large in absolute terms compared to other UNFPA projects, this assistance was equivalent to approximately 2.8 percent of the total planned government contribution for that period ($138,088,771), although no data are available on actual government expenditures (UNFPA, 1982a). Most of the aid, first received in 1976, was used to improve maternal and child health services by furnishing polyclinics and pediatric and maternity hospitals with equipment for obstetrical/gynecological procedures and pregnancy termination, as well as contraceptive supplies. Prenatal care, supervised deliveries, reduction in perinatal risk, and improvement in neonatal care were emphasized. Training fellowships for personnel involved in the maternal and child health program were also provided (United Nations, 1977; UNFPA, 1975).

Cuba received further assistance under a joint agreement with UNFPA calling for $6 million between 1979 and 1982, equivalent to approximately 6.5 percent of the total planned government contribution of $92,600,000. UNFPA assistance was to be used to expand the maternal and child health program; improve the collection, analysis, and dissemination of vital statistics and demographic data, including the 1981 Census of Population and Housing; and provide demographic training. During the period 1975-81, UNFPA expenditures for Cuban projects totaled $6,430,601.[20]

The International Planned Parenthood Federation (IPPF) has provided financial assistance to Cuba since 1971 through the Cuban Scientific Society for Family Welfare (SOCUDEF), which was granted associate membership in IPPF in 1980. Financial support and commodities (contraceptives, medical equipment, and materials for contraceptive and sex education) provided to Cuba by IPPF totaled $221,400 in 1978, $248,201 in 1979, and $245,000 in 1980 (IPPF, 1982).

There is no minimum age for purchase of contraceptives in Cuba, nor is the permission of spouse or parents required. In fact, no norms have been established regarding the provision or delivery of contraceptive methods, although physicians seem well-informed about contraindications and side-effects associated with various methods. The main contraceptive methods available are IUDs, female sterilization, and oral contraceptives; pills, condoms, and spermicides (tablets, jellies, and creams) are sold in national pharmacies at low cost, and all other methods are free. While all methods are available, no contraceptive prevalence data have been collected at the national level. The IUD and female sterilization are most popular, according to the results of a recent fertility survey conducted in an urban municipality of Havana.

Although pamphlets on contraceptive methods include discussion of rhythm, withdrawal, douche, and spermicides, these are described as relatively ineffective in preventing pregnancy, as is breastfeeding; use of contraception prior to the resumption of postpartum sexual relations is advocated (Rodriquez Castro, 1981). Condoms are recommended for adolescent males and in situations of irregular coitus; however, although supplies of condoms are made available in pharmacies, they are reportedly unpopular. IUD insertions are performed free in polyclinics and hospitals, both postpartum and postabortion. Gynecologists prefer the IUD for birth spacing since this method is regarded as effective with an acceptable level of risk. Diaphragms are also available in health units. Low-dose oral contraceptives have been used in Cuba since the mid-1970s, provided by international donations and manufactured in Cuba from imported materials. Sold in pharmacies with or without prescription, a 1-month cycle of 20 or 21 tablets costs one peso (currently U.S.

$1.32). Women are urged to consult a physician at the beginning of use and periodically thereafter, although there is no explicit follow-up of pill acceptors, except in a few health clinics that follow contraceptive users with high-risk characteristics.

Sterilization is also available. However, one reported barrier to greater reliance on this method is the shortage of specialists trained in new sterilization techniques. Social workers also discourage reliance on sterilization, advocating reversible forms of contraception instead. Female contraceptive sterilization is usually performed in hospitals; mini-laparotomy and laparotomy are the main techniques, although laparoscopic sterilization has recently been introduced in Havana. Current age and parity restrictions limit sterilization to women who are at least 28 years of age with three children. Husbands must be informed of the procedure, although their consent is not required. Therapeutic sterilizations may also be obtained, with the approval of hospital directors, for various medical indications (maternal or child health, previous history of high-risk pregnancy or cesarean section). Vasectomies are also performed by urologists in Havana. However, as in other Latin American countries, this method is unpopular, and its prevalence is described as "minimal" (Rodriguez Castro, 1980), probably because of the availability of female sterilization and attitudes of *machismo*.

The Role of Mass Organizations Through integration with mass organizations, health care, including education on family planning, is designed to ensure contact with the large majority of adult citizens, many of whom have multiple memberships. Particularly active in this regard are the Committees for the Defense of the Revolution (CDR), which exist on nearly every block in urban areas and in defined districts in rural areas. Originally organized in 1960 to guard against sabotage and to assist in the organization of the militia, they have since broadened their activities to include mobilization for volunteer work in public health. The CDR is responsible for registration of the population at the appropriate polyclinic; records of immunization schedules (polio, tetanus, diphtheria, and pertussis) for those at high risk in the local neighborhood; control of mosquitoes; environmental upgrading; and street cleaning (Danielson, 1979). Health and hygiene representatives in each CDR are also responsible for matters such as promoting the use of prenatal services and postpartum medical care for infants, motivating women to obtain Pap smears, and following up on polyclinic patients who have missed appointments.

The Federation of Cuban Women (FMC) mobilizes neighborhood women for volunteer work, runs national day care centers and literacy and educational classes for women, and assists in the acquisition of employment and child care; it also works in the areas of pediatric and maternal health, sex education, and family nutrition. At meetings of the CDR and FMC, polyclinic staff provide presentations and discussions concerning pregnancy, sexuality, breastfeeding, nutrition, pre- and postpartum care, family planning, and parental responsibilities as outlined in the Family Code. Some information on health is periodically provided by the press and by radio and national television. In coordination with the Ministry of Public Health, a bi-weekly television program is broadcast ("Ciencia y Salud" ["Science and Health"]); press coverage is provided through magazines produced by the FMC for women and teenagers. However, the major source of information is the classes in family planning, preparation for childbirth, and infant care conducted in polyclinics and maternity homes prior to birth. Advice on contraceptive use is provided by personnel in several specialties, including obstetrical nurses, psychologists, social workers, and obstetrician-gynecologists. Special education efforts, explaining the risk of additional pregnancies, are directed at older, high-parity women and those with special health problems.

Sex Education In 1975, the first Congress of Cuba's Communist Party approved a resolution calling for adequate sex education. When the Cuban National Assembly of Popular Power was elected in 1975, it established a Permanent Commission for matters relating to children and the equality of women. The Commission began formulating a program for sex education in 1977, coordinated since 1979 by the National Working Group on Sex Education, which is composed of members of various mass organizations (the Cuban Federation of Women, the Union of Young Communists, plus representatives of the Ministries of Public Health and Education). The program emphasizes biological and social aspects of sexuality, responsible parenthood, and instruction in contraception and abortion. Although financial resources devoted to activities are limited, work to date has emphasized publications and mass media programs on sex education, the development of sex education programs for specific population groups, and training of personnel in sex education. Coordination between the National Working Group, mass organizations, and the Ministries at the national and provincial levels provides a network through which sex education activities can be conducted on a national basis.

Although supplies are currently exhausted, three books have so far been produced, based on books already published in the German Democratic Republic: one for the general population; one for adolescents; and one for professionals. Two pamphlets on prenatal development have been published for incorporation in the school curriculum, for children 9 to 12 and their parents; materials for children below age 9 and their parents are in preparation.

No data are available by which to judge the effect of previous sex education activities on knowledge, attitudes, and practices of adolescents with regard to parenthood, contraception, or abortion. As noted above, although the fertility of women aged 15-19 declined in the late 1970s, the relative role in this decline of availability of contraception, sex education, and various demographic factors cannot be discerned.

Contraceptive Prevalence

No national data on contraceptive use have been collated by Cuba's Ministry of Public Health. Provincial- and national-level data are available on sales of oral contraceptives and condoms and on the distribution of IUDs and oral contraceptives to health units; however, these data are rarely converted into estimates of the number of women protected. Although each polyclinic records information on the number of sterilizations performed, on IUD acceptors and removals, and on the use of other methods, these statistics are not centralized nationally. Thus, data on new acceptors, continuation rates, reported side-effects, and patterns of method switching, as well as contraceptive prevalence by type of method, age group, province, and rural-urban residence, are unavailable (UNFPA, 1982b).

Data on contraceptive knowledge and use in Cuba during the last decade are limited to information from five fertility surveys conducted between 1971 and 1973 and a study conducted in 1980 (Alvarez Vazquez, 1972, 1973, 1975; Alvarez Vazquez and Alvarez Lajonchere, 1978; Alvarez Vazquez and Ruben Quesada, 1973; Gonzalez de la Cruz, 1980; Vila and Alvarez, 1980). The surveys undertaken in the early 1970s include one conducted in a region within the metropolitan area of Havana (Plaza de la Revolucion); two conducted on the periphery of Havana (Marianao and Bauta); one in the city of Santa Clara, capital of the central province of Las Villas; and one in the rural mountainous region of Yateras in the province of Oriente.[21] The 1980 survey was conducted in Arroyo Naranjo, an area with semi-rural characteristics at the edge of the city of Havana.

Although not shown in tabular form, the survey data indicate that more than 90 percent of the women interviewed in the early 1970s knew of at least one method among the seven listed. The IUD was best known, followed by female sterilization and the condom; the least-known method was the pill. Data on contraceptive knowledge collected in the more recent survey in Arroyo Naranjo demonstrate widespread knowledge of all methods distributed through the health system: more than 90 percent of the women knew of the condom, sterilization, pill, and IUD; somewhat lower levels of knowledge (75-78 percent) were recorded for the diaphragm, douche, rhythm, and withdrawal.

Although Table 37 and Figure 15 provide data on levels of past use and contraceptive prevalence levels, they typically pertain to samples of women aged 15-49, rather than to women in union. During the early 1970s, the highest levels of past use were recorded for the IUD and the condom; sterilization was the most frequently used method among women above age 35. In the early 1970s, approximately 35 to 64 percent of the women of reproductive age surveyed reported that they were currently using a method of contraception, with the lowest proportion recorded in rural Yateras and the highest in Ciudad Bauta. These figures are somewhat inflated since they include women who were using more than one method at a time, allowing for the possibility of double counting. Considerably smaller proportions of women (25-34 percent) in the urban areas and 22 percent in rural Yateras were currently using an effective contraceptive method (IUD, sterilization, diaphragm, or pill). Use of the IUD ranged from 16 percent to 22 percent. Sterilization ranged from 5 percent to 13 percent; despite widespread knowledge of this method, access is restricted by various age and parity regulations. Use of the pill, supposi-

TABLE 37 Percent of Women Aged 15-49 Reporting Ever Use and Current Use of Contraception for Selected Sites, 1972-80: Cuba

	Yateras 1972		Plaza de la Revolucion 1971		Ciudad Santa Clara 1972		Ciudad Bauta 1973		Municipio Marianao 1973		Arroyo Naranjo[a] 1980	
Method	Ever Use	Current Use[b]	Ever Use	Current Use[b]	Ever Use	Current Use[b]	Ever Use	Current Use[b]	Ever Use	Current Use[b]	Ever Use	Current Use
Total	--	34.6	--	54.7	--	56.8	--	63.9	--	53.6	--	68.4
Intrauterine device	28.6	16.5	28.5	17.3	23.0	15.9	33.0	21.4	37.1	22.2	62.4	37.0
Female sterilization	5.1	5.1	7.3	7.3	12.5	12.5	8.4	8.4	9.3	9.3	15.8	15.8
Condom	12.5	3.5	31.6	7.0	39.1	11.4	41.3	11.3	30.5	6.2	29.3	3.5
Withdrawal	13.4	6.4	25.0	7.4	28.3	9.5	25.4	7.7	20.6	4.2	16.7	2.1
Rhythm	6.1	3.1	25.7	8.0	20.3	7.5	15.9	6.6	19.0	4.2	18.5	1.6
Other[c]	9.4	--	46.7	7.7	32.3	--	39.4	6.9	37.6	5.3	21.7	1.6
Diaphragm	--	--	9.5	--	--	--	7.1	1.6	7.6	1.8	10.7	--
Pill	--	--	2.8	--	--	--	0.1	--	0.9	0.4	22.6	6.8

Note: -- indicates data unavailable.

[a] Percentages are based on women living in union. All other urban samples are probability samples of women in their reproductive years 15-49 with the exception of the Yateras study, which was a census of all women of reproductive age.
[b] Figures on current use include users of multiple methods and are therefore somewhat inflated.
[c] Other includes douche, contraceptive jelly, cream, and vaginal suppositories.

Sources: Santa Clara data: Alvarez Vazquez (1973). Yateras data: Alvarez Vazquez (1972). Bauta and Marianao data: Gonzalez de la Cruz (1980). Plaza de la Revolucion data: Alvarez Vazquez and Ruben Quesada (1973). Arroyo Naranjo data: Vila and Alvarez (1980).

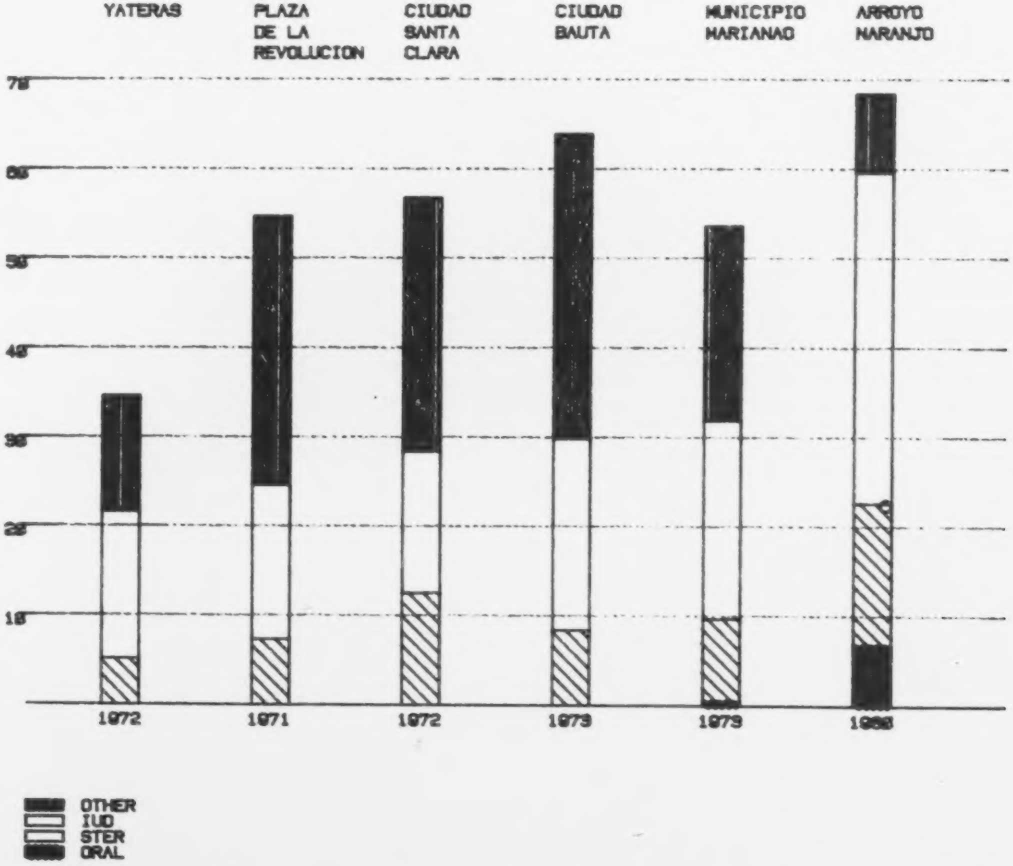


FIGURE 15 Contraceptive Prevalence Rates Among Women Aged 15-49, by Method, Selected Sites, 1972-80: Cuba

tories, jellies, and diaphragm was extremely limited; around 8 percent of the women in Bauta and Marianao reported currently using one of these methods in 1973.

Data on the proportion of women currently in union who were using contraception are scant. In Marianao, 47.9 percent of the women of reproductive age were currently using a method (excluding multiple-method uses); among those currently in union, the proportion was 71.1 percent. In Bauta, 55.6 percent of women of reproductive age were current users; among those currently in union, the proportion was 74.5 percent. The proportion of women of reproductive age living in union appears to be 70 to 75 percent for the urban areas and 80 percent for rural Yateras. Thus, it can be estimated that the proportion of women currently in union who were using effective contraceptive methods at the time of the interview was 33 to 49 percent (25/75-34/70) in urban areas and 28 percent (22/80) in the rural sample.

The 1980 survey conducted in Arroyo Naranjo, also shown in Table 37, is not directly comparable to the earlier studies since it sampled women aged 15-49 living in union rather than all women of reproductive age. This more recent survey showed a higher figure than the earlier surveys for use of contraception among urban women in union: 68 percent were current users, while 60 percent were using the three most effective methods--IUD (37 percent), sterilization (16 percent), and pill (7 percent); in comparison, an estimated 33 to 49 percent of urban women in union were using effective contraceptive methods in the early 1970s. However, given differences in the marital composition of the samples, time trends in method use cannot be accurately assessed. Moreover, no data on contraceptive prevalence by age group have been published recently to indicate shifts in method use.[22] The pill is thought to be the most frequently used method among adolescents, accounting in part for the decline since 1977 of fertility among those aged 15-19. However, no data are available to corroborate this assumption.

As noted above, no national data on contraceptive prevalence, number of acceptors, or continuation rates are available for Cuba. However, empirical data show a close relationship between the contraceptive prevalence rate and the crude birth rate. The straight line of best fit to 37 points (32 countries, five with points at two periods), relating the prevalence rate and the crude birth rate a year later for the late 1970s, suggests that every 2.4 percentage point increase in contraceptive prevalence is associated with a one point decline in the birth rate. According to the regression relation (Y = 46.9 - .42X), the crude birth rate would be 47 if no couples practiced contraception and 5 if all did (Nortman and Hofstatter, 1980). On the basis of this equation, it can be estimated that some 53 percent of all married women of reproductive age were using contraception in 1972 (1973 crude birth rate of 25), in comparison to 79 percent in 1980 (1981 crude birth rate of 14). These figures are high given the level of induced abortion in Cuba; other factors influencing the relationship are marriage patterns, prevalence and duration of lactation, and age structure.

On the basis of these limited data, it appears that Cuba's relatively low prerevolutionary birth rate was achieved through use of less effective contraceptive methods and abortion. In the immediate postrevolutionary period, a decline in the prevalence and practice of both is partially responsible for the upturn in the birth rate, followed by a reversion to the previous pattern by the early 1970s. By 1980, the increased availability of government-supplied contraceptives (primarily the pill, the IUD, and sterilization) had resulted in reduced reliance on less effective methods, higher contraceptive prevalence, and greater access to contraceptive services.

The effect of this greater availability of modern contraceptives since the mid-1970s on reducing reliance on legalized abortion is examined in the next section, as is the impact of government policies liberalizing abortion and the resulting reduction in fertility and abortion-related mortality.

Access to Abortion and Declines in Fertility and Abortion-Related Mortality

Table 38 presents data on abortion incidence in Cuba during 1968-80, a period, as noted above, of increased access to legal abortion and sharply declining fertility.[23] Total abortions have been divided into legal and "other" (a category including spontaneous abortions, some therapeutic curettage related to uterine and gynecological diseases, and incomplete illegal abortions requiring medical treatment).[24] Two measures of abortion incidence are presented: the abortion rate, which measures the incidence of legal and total abortions per 1,000 women aged 15-44; and the abortion ratio, which

TABLE 38 Number of Women Aged 15-44, Number of Live Births and Abortions, Abortion Rates and Ratios, and General Fertility Rate, 1968-81: Cuba

Year	Women 15-44 (in 1,000s)	Live Births	Legal Abortions	Other Abortions	Total Abortions[a]	Legal Abortion Rate[b]	Total Abortion Rate[b]	Legal Abortion Ratio[c]	General Fertility Rate
1968	1,708	251,857	28,485	43,424	71,909	16.7	42.1	103	147.5
1969	1,731	246,005	46,080	47,420	93,500	26.6	54.0	160	142.1
1970	1,754	237,019	70,521	42,485	113,006	40.2	64.4	222	135.1
1971	1,788	256,014	84,823	36,224	121,047	47.4	67.7	252	143.2
1972	1,822	247,997	100,045	34,056	134,101	54.9	73.6	297	136.1
1973	1,858	226,005	112,107	32,069	144,176	60.3	77.6	343	121.6
1974	1,893	203,066	131,536	33,718	165,254	69.5	87.3	399	107.3
1975	1,930	192,941	126,107	33,510	159,617	65.3	82.7	399	100.0
1976	1,991	187,555	121,415	31,039	152,454	61.0	76.6	405	94.2
1977	2,053	168,960	114,829	30,647	145,476	55.9	70.9	420	82.3
1978	2,118	148,249	110,431	27,420	137,851	52.1	65.1	431	70.0
1979	2,185	143,551	106,549	25,546	132,095	48.8	60.5	432	65.7
1980	2,205	136,900	103,974	24,896	128,870	47.2	58.4	--	62.1
1981[d]	2,271	136,211	--	--	--	--	--	--	60.0

Note: -- indicates data unavailable.

[a] Total abortions equal legal abortions plus other abortions.
[b] Procedures per 1,000 women, 15-44.
[c] Legal abortions per 1,000 total pregnancies (abortions plus live births) in the year beginning six months after the year in which abortions were measured.
[d] Provisional data.

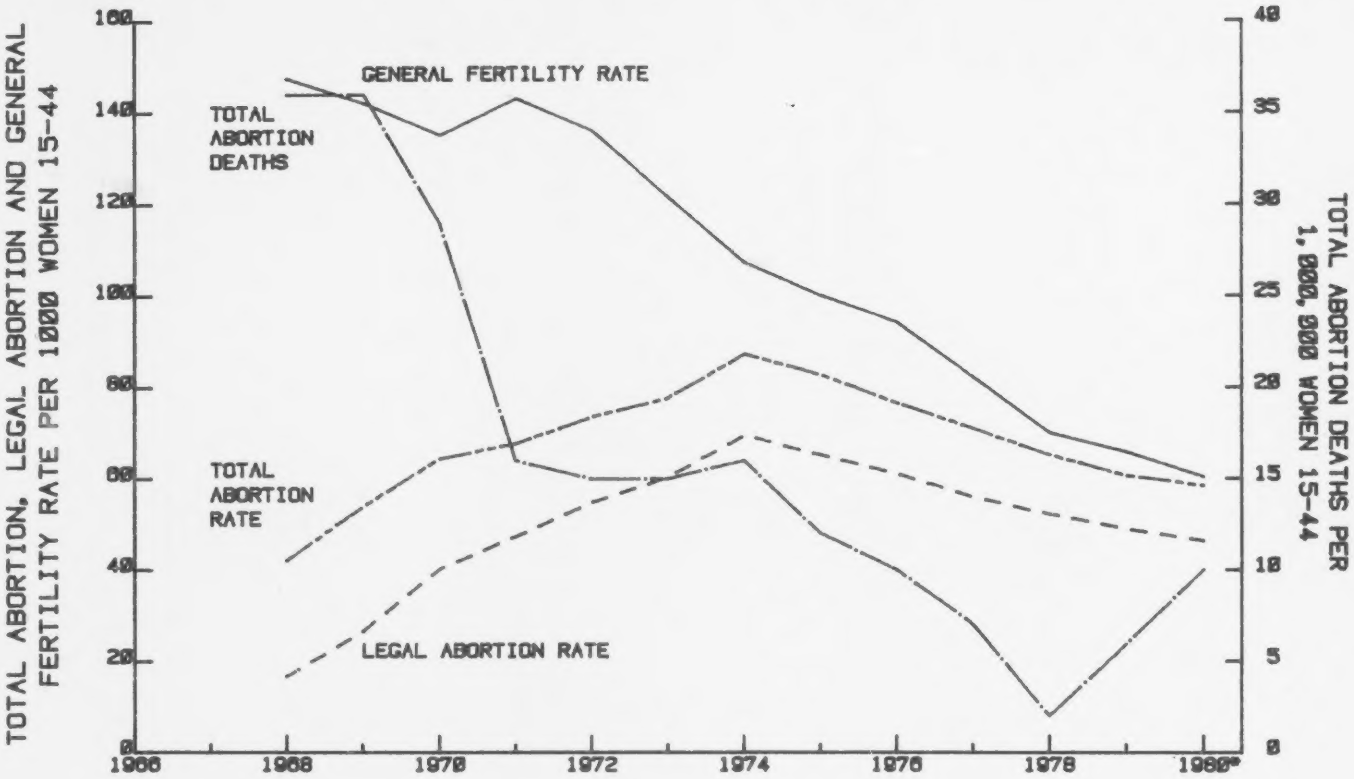
Sources: Ministerio de Salud Publica de Cuba (1979, 1981); JUCEPLAN, C.E.E. (1981); Rodriguez Castro (1978); United Nations (1976); UNFPA (1982b).

expresses the proportion of all pregnancies ending in legal abortion, defined as the number of legal abortions per 1,000 pregnancies (abortions plus those live births taking place during a 12-month period commencing 6 months later than the period during which abortions were measured, to give a reasonable approximation of the conception cohort). Mortality rates have also been calculated, based on the number of births in a calendar year. To examine the effect of declining fertility and increased abortion availability on mortality, various rates have been calculated for maternal mortality, total abortion mortality, legal abortion mortality and nonabortion mortality, which excludes deaths related to legal and other abortions.

Between 1968 and 1971, the general fertility rate (the number of births per 1,000 women of reproductive age) fluctuated between 148 (in 1968) and 143 (in 1971) (Table 38 and Figure 16). Since then it has fallen consistently to a provisional rate of 60 in 1981. Increasing access to legal abortion sharply reduced the incidence of illegal abortions during this period: in 1968, other abortions represented substantially more than one-half of the total abortions reported; by 1980, this proportion had been reduced through greater availability and better education to only about one-fifth of all abortions, indicating that the "other" category now includes primarily spontaneous abortions (Hollerbach, 1980a).

Increased availability of legal abortion has reduced the number of deaths and death rates associated with abortion, as noted in Table 39 and Figure 16. In 1968, 62 abortion deaths were recorded, of which 61 were due to other abortions, including illegal procedures. The total abortion death rate was 3.6 per 100,000 women aged 15-44; the legal abortion death rate was 0.06 per 100,000. In 1974, only 30 abortion-related deaths were recorded, of which 29 were associated with other abortions. The legal abortion death rate was nearly the same in 1968--0.05 per 100,000 women aged 15-44--but the total abortion death rate had fallen to 1.6 as a result of the declining incidence of the more dangerous illegal abortions. This compares favorably with abortion mortality figures for the United States, Hungary, and Czechoslovakia (Tietze, 1983).

Increased availability of legal abortion has also reduced the incidence of total abortion mortality, which increased from 13.7 deaths per 100,000 live births in 1960 to a high of 25 deaths in 1969, and subsequently



* PROVISIONAL (1979, 1980)

FIGURE 16 Total Abortions, Legal Abortions, and General Fertility per 1,000 Women Aged 15-44, and Total Abortion Deaths per 1,000,000 Women Aged 15-44, 1968-80: Cuba

TABLE 39 Measures of Abortion-Related and Nonabortion-Related Maternal Mortality, 1968-81: Cuba

Year	Maternal Mortality Rate[a]	Total Abortion Mortality Rate[a]	Non-Abortion Mortality Rate[a]	Legal Abortion Mortality Rate[b]	Total Abortion Deaths	Legal Abortion Deaths	Total Abortion Deaths per 100,000 Women, 15-44	Legal Abortion Deaths per 100,000 Women, 15-44
1968	83.0	24.6	58.4	--	62	1	3.6	0.06
1969	85.0	25.2	59.8	--	62	--	3.6	--
1970	70.5	21.5	49.0	--	51	--	2.9	--
1971	67.6	11.3	56.3	1.2	29	1	1.6	0.06
1972	52.0	10.9	41.1		27	0	1.5	0.00
1973	55.3	12.4	42.9		28	3	1.5	0.16
1974	58.1	14.8	43.3		30	1	1.6	0.05
1975	68.4	11.9	56.5	1.1	23	2	1.2	0.10
1976	47.5	10.7	36.8		20	0	1.0	0.00
1977	49.1	8.9	40.2		15	3	0.7	0.15
1978	45.2	3.4	41.8		5	0	0.2	0.00
1979	51.5	9.8	55.9	--	14	--	0.6	--
1980	52.6	15.3	46.8	7.7	21	8	1.0	0.36
1981[c]	40.4	--	--	--	--	--	--	--

Note: -- indicates data unavailable.

[a] Per 100,000 live births. This rate takes into account all maternal deaths associated with abortions (legal and all other abortions).

[b] Per 100,000 legal abortions.

[c] Provisional data.

Sources: Ministerio de Salud Publica de Cuba (1979, 1980, 1981); JUCEPLAN, C.E.E. (1981); Rodriguez Castro (1978); United Nations (1976); UNFPA (1982a). Statistics on mortality on file at the World Health Organization data bank in June 1980, supplied by Dr. H. Hansluwka.

declined steadily to 3.4 deaths per 100,000 live births in 1978. Since 1978, this figure has increased to 15.3 deaths per 100,000 live births. This recent rise is in part attributable to a sudden increase in deaths associated with legal abortion: among the 72 maternal deaths from all causes recorded in 1980, 21 were associated with total abortion and 8 with legal abortion; the legal abortion mortality rate increased to 7.7 in 1980. Recent international data suggest an average of 1 death per 100,000 abortion procedures within a hospital setting. Thus, the recent Cuban figure is about eight times higher than might be expected (UNFPA, 1982b).[25] Cuba's non-abortion mortality rate of 47 deaths per 100,000 live births is still considerably below the earlier figures recorded for 1968-69 (58-60 deaths), in part because of the integrated maternal-child health program.

With the reduction in the incidence of illegal procedures, the incidence of legal abortion rose. As noted in Table 38 and Figure 16, the legal abortion rate per 1,000 women aged 15-44 rose from 17 in 1968 to 70 in 1974. Expressed as a total abortion rate (the average number of abortions per woman during her lifetime at prevailing incidence levels), the rate increased from .5 abortions per woman in 1968 to 2.1 abortions in 1974. After that point, largely because of the greater availability of effective contraceptives, the rate declined to an estimated 47 in 1980, or 1.4 abortions per woman.

The abortion ratio showed substantial and consistent annual increases throughout the period, however, as noted in Table 38. From 103 in 1968, the ratio rose to 432 per 1,000 pregnancies in 1979, indicating that fertility declines have been accomplished by a heavy reliance on induced abortion as a back-up method in case of contraceptive nonuse or failure (Hollerbach, 1980a). Recent abortion data show that only four countries had higher abortion ratios than Cuba's during the 1970s: Bulgaria (95 in 1979); Japan (47 in 1975); Romania (498 in 1979); and the U.S.S.R. (700 in 1970) (Tietze, 1983). The abortion ratio for Havana is higher than the overall rate for Cuba, and the reported incidence is generally higher in urban than in rural areas of the country.[26]

It is probable that in the early period following abortion liberalization, abortion was used primarily by higher-parity women to prevent unwanted births. As noted above, educational efforts were originally directed at high-parity women, and in 1968 only 10 percent of all known pregnancies (excluding spontaneous and illegal induced abortions) were terminated through legal abortion. In the early 1970s, the rise in the legal abortion rate was probably associated with the increased availability of abortion services and the relaxed use or method failure associated with traditional contraceptive methods. By 1979, the incidence of abortion and the legal abortion rate had again declined with the greater availability and use of effective contraceptive methods. However, the abortion ratio continued to rise as fertility dropped precipitously during the decade. By 1979, 40 percent of all known pregnancies were terminated by abortion. This increase may be attributable to low fertility desires, as expressed in the 1979 National Demographic Survey, as well as to reliance on abortion in preference to contraception or in situations of contraceptive failure.

DECOMPOSITION OF THE PROXIMATE DETERMINANTS OF FERTILITY

The fertility effects of the four most significant proximate determinants of fertility--proportions in union, contraceptive prevalence and effectiveness, incidence of induced abortion, and duration of postpartum infecundability--as measured through the Bongaarts (1982) model, can be assessed only for the early 1970s. Although the data required to calculate the indices are available from a variety of sources, these measures differ in quality, representativeness, and time period. Data on the proportions of women in union by age group are available from the 1970 Cuban census. Data on contraceptive prevalence are available from a series of community fertility surveys described above, conducted in one rural and four urban areas between 1971 and 1973. Breastfeeding data are available from a 1973 national cohort survey of infants followed until age 7 months, and therefore require crude extrapolation of the duration of breastfeeding. In contrast, age-specific fertility data and data on the abortion rate are of extremely high quality, but pertain to all women of reproductive age, rather than to women in union as specified by the Bongaarts model. Given the overlap in years, age-specific fertility data for 1972 have been incorporated in the present decomposition exercise as the mid-point of the time periods applicable to the majority of data sets (1970-73); thus, the decomposition pertains to the incipient period of the sharpest decline in Cuban fertility. Availability of effective contraceptive methods was still comparatively limited in 1971-73 and the legal abortion rate was rising.

The Index of Marriage

The equation used is

$$C_m = \frac{TFR}{TM} = \frac{\sum f(a)}{\sum f(a)/m(a)},$$

where m(a) equals the proportion of women currently in legal and consensual union in 1970 by five-year age groups, and f(a) is a schedule of age-specific fertility rates in 1972. Official Cuban estimates of the latter apply to all births to all women aged 15-49.

Age Group	Age-Specific Fertility Rates 1972 f(a)	Proportion of Women in Union, 1970 m(a)	Age-Specific Marital Fertility Rates g(a) = f(a)/m(a)
15-19	143.8	.28	(270.0)
20-24	237.6	.66	360.0
25-29	167.9	.79	212.5
30-34	113.0	.83	136.1
35-39	66.1	.84	78.7
40-44	23.7	.82	28.9
45-49	2.7	.80	3.4
TFR	3.774		
TM			5.448

Therefore, $C_m = \frac{3.774}{5.448} = 0.693$.

Bongaarts suggests that the value of the age-specific marital fertility rate g(a) for the age group 15-19 be estimated as g(15-19) = 0.75 x g(20-24), since the direct estimate f(15-19)/m(15-19) tends to be unreliable, especially in populations with low values of m(15-19). The indirect estimate suggested by Bongaarts gives a value of g(15-19) of 270.0. The total marital fertility rate is 5.45, resulting in a C_m of .693.

The Index of Contraception

The equation used is

$$C_c = 1 - 1.08 \times e \times u,$$

where u is the prevalence of current contraceptive use (including male methods and sterilizations) among married women of reproductive age (15-49), e is the average use-effectiveness of contraception, and 1.08 is a sterility correction factor. The estimated use-effectiveness levels employed pertain to specific values recommended by Bongaarts for developing countries, based on method-specific values adapted from data from the Philippines. The schedule for developing countries was employed given the prevalence of traditional contraceptive methods in Cuba during 1971-73.

National contraceptive prevalence data for Cuba do not exist, and the actual mix of methods remains unknown. As noted above, the data available pertain to one rural and four urban areas from studies conducted between 1971 and 1973. The method-specific prevalence rates published apply to all women 15-49 in the original samples, rather than to women in union, as specified by the Bongaarts model. Thus, the method-specific prevalence rates underestimate the actual prevalence rates, and u(m) must be adjusted.

Method	Low Fertility u(m)	Moderate Fertility u(m)	High Fertility u(m)	Weighted Combined u(m)	e(m) Developing	e(m)u(m)
Sterilization	.083	.125	.051	.085	1.00	.085
Pill	.004	.000	.000	.001	.90	.001
IUD	.203	.159	.165	.177	.95	.168
Condom	.082	.114	.035	.077	.70	.054
Diaphragm	.017	.000	.000	.006	.70	.004
Foam/Cream/ Jelly	.066	.000	.000	.023	.70	.016
Rhythm	.063	.075	.031	.056	.70	.039
Withdrawal	.064	.095	.064	.074	.70	.052
Other	.000	.000	.000	.000	.70	.000
				u = .499		.419

A second methodological concern relates to the areas sampled. The data on prevalence pertain to areas of low, moderate, and high fertility. In order to obtain some estimate of prevalence at the national level, the prevalence data by method for the three areas of Havana were averaged to represent a rough approximation of the contraceptive prevalence rate in the two provinces of lowest fertility in 1972 (La Habana and Matanzas, which had TFRs of 2.8 and 3.4, respectively). The data for Santa Clara, an area chosen to represent a moderately low fertility situation, represent a rough approximation of contraceptive prevalence in the provinces of Las Villas, Camaguey, and Pinar del Rio, with TFRs ranging from 3.6 to 3.7 in 1972. Finally, the data for Yateras represent the contraceptive prevalence rate in the province of Oriente, which had the highest TFR in 1972 (4.2); according to the 1970 census, 51.5 percent of Cuba's total population classified as rural resided in the province of Oriente.

Thus, three schedules of u(m) were calculated. Next, the data were adjusted by weighting the distributions by the proportion of all women 15-49 residing in the six provinces. According to the 1970 census, 34.9 percent of the women aged 15-49 resided in the province of La Habana and Matanzas; 31.4 percent in Las Villas, Camaguey, and Pinar del Rio; and 33.7 percent in Oriente.

The weighted value of u, corresponding to the prevalence of current contraceptive use among all women aged 15-49, was .499, and $\Sigma\, e(m)u(m)$ is .419, use-effectiveness, $e = \Sigma\, e(m)u(m)/u = \frac{.419}{.499} = .840$. However, since this derived value of u is an underestimate of the true value of u for all married women, and since the studies are limited to certain locales in Cuba, the value of .53 was substituted as an approximation of u for purposes of calculating C_c. As previously noted, on the basis of the equation ($Y = 46.9 - .42X$), it is estimated that some 53 percent of all married women of reproductive age were using contraception in 1972 (CBR of 25 in 1973). For Cuba, $u = .53$ and $e = .840$, so that $C_c = 1 - 1.08 \times .840 \times .53 = .519$.

The Index of Abortion

The formula used is

$$C_a = \frac{\text{TFR}}{\text{TFR} + 0.4 \times (1 + u) \times \text{TA}},$$

where TA equals the total abortion rate, equivalent to the total fertility rate, that is, the average number of abortions per woman during her lifetime if present abortion levels prevailed. The data on abortion apply to all women, rather than abortions to married women as specified in the Bongaarts model. The abortion rate was calculated as the legal abortion rate (procedures per 1,000 women 15-44) in 1972, 54.9 x .03 = 1.647. Thus the estimated total induced abortion rate was 1.65 abortions per woman in 1972. Therefore,

$$C_a = \frac{3.774}{3.774 + 0.4 \times (1 + .53) \times 1.65} = .789.$$

The Index of Postpartum Infecundability

The final index, postpartum infecundability, is measured as

$$C_i = \frac{20}{18.5 + i},$$

where i is the mean duration of postpartum infecundability. Since a direct measure of i was not available, its approximate value was calculated by extrapolating the truncated breastfeeding data in Table 34, allowing a 2-percent decline in the proportion of children breastfed for every 1-month period beyond 7 months until about age 2. The mean duration of breastfeeding calculated in this manner is 6 months. Using the equation $i = 1.753 \exp(0.1396 \times B - 0.001872 \times B^2)$, $i = 1.753 \exp(0.838 - 0.067)$, or 3.79; $C_i = \frac{20}{18.5 + 3.79} = .897$.

Model Estimate of the Total Fertility Rate

On the basis of the data in Table 40, the TFR is finally estimated as $C_m \times C_c \times C_a \times C_i \times TF$ or $(.693 \times .519 \times .789 \times .897 \times 15.3) = 3.89$. This derived estimate is only slightly higher than the total fertility rate of 3.77 originally calculated for all women aged 15-49 and within an acceptable range of variation.

Each index takes on a value between 0 and 1. The lower the value of any index, the larger its relative fertility-modifying effect. As illustrated in Table 40--which provides measures of the intermediate fertility variables, the indices, and the total, marital, and natural marital fertility rates for Cuba--the effect of contraception is the most significant

TABLE 40 Measures of the Intermediate Fertility Variables, the Indexes and the Total, Marital, and Natural Marital Fertility Rates for Cuba, 1972, and for Countries in Phase Three of a Synthetic Transition (TFR 3.0-4.5)

Measures	Cuba	Phase III Societies[a]
Prevalence of contraceptive use	0.53	0.40
Use-effectiveness of contraception	0.84	0.86
Total induced abortion rate	1.65	0.38
Postpartum infecundability (in months)	3.79	8.50
Index of marriage	0.693	0.551
Index of contraception	0.519	0.630
Index of induced abortion	0.789	0.961
Index of postpartum infecundability	0.897	0.763
Total fertility rate	3.77	3.88
Total marital fertility rate	5.45	7.05
Model estimate of total fertility rate	3.89	--
Total natural marital fertility rate[b]	13.72	11.67

[a] The data were obtained by averaging data from four countries; see Bongaarts (1982:Table 4).

[b] Estimated as 15.3 times the index of postpartum infecundability.

(.519), followed by the effect of marriage patterns (.693). The fertility-inhibiting effects of these two factors is significantly greater than the effect of either abortion (.789) or postpartum infecundability (.897).

In 1972, the total abortion rate in Cuba was 1.65 abortions per woman; close to one-third of all known pregancies were terminated by legal abortion. Only 25-34 percent of women of reproductive age in urban areas and 22 percent in rural Yateras were currently using an effective contraceptive method (IUD, sterilization, diaphragm, or pill). The corresponding proportions relying on traditional contraceptive methods varied from 20-33 percent in the urban areas to 13 percent in Yateras. However, decomposition of the proximate determinants demonstrates that both contraceptive use and marriage patterns were more significant fertility-modifying factors than induced abortion.

The data provided in Table 40 on phase-three societies are subject to large sampling errors because of the small number of populations included in the averages. Comparisons of these societies and Cuba show that Cuba's prevalence of contraceptive use is higher, while its use-effectiveness of contraception is similar, given the high proportion of women using traditional methods at the time. However, not surprisingly, Cuba has a much higher total induced abortion rate and a shorter duration of postpartum infecundability. With respect to the indices, contraception, and especially induced abortion, are more significant determinants of the total fertility rate in Cuba than they are in other phase-three societies; marriage and postpartum infecundability are less significant.

Chapter 4

THE DETERMINANTS OF FERTILITY: ECONOMIC AND SOCIAL POLICIES AND PATTERNS

As noted above, few countries have undergone demographic changes as drastic as those of Cuba over the last quarter of a century. The factors influencing this fertility decline are complex and difficult to disentangle. This is true not only for the proximate determinants of Cuban fertility previously discussed, but also for the fertility determinants--economic and social policies and patterns. Although empirical data on these determinants are abundant, direct evidence linking these variables to fertility behavior is generally quite limited, and inferences must be drawn from the available data.

In assessing the impact of economic and social changes on Cuban fertility, it is essential to bear in mind that the revolutionary experience initiated in 1959 has radically changed many traditional institutions. However, these changes have apparently not altered many normative and behavioral patterns associated with the historical emergence of those institutions. In addition, it is critical to remember that the process of revolutionary change has been very dynamic and fluid. Significant social achievements in the areas of health services, education, and income distribution have been made under difficult economic conditions. Positive and negative developments in certain areas of social and economic life appear to have interacted in very complex ways, influencing the course of fertility through countervailing means.

The following discussion attempts to describe those policies and patterns which appear to have encouraged fertility decline, as well as the manner in which they have affected different segments of the Cuban population. First, it focuses on various postrevolutionary economic policies and patterns, analyzing trends in aggregate economic growth, income distribution, levels of material consumption, old age security, male and female employment, and resulting time constraints. This is followed by a discussion of various social policies and patterns pertaining to education, health services, mortality reduction, and housing. Throughout the discussion, links between fertility and various policies and patterns are suggested.

ECONOMIC POLICIES AND PATTERNS

Aggregate Economic Growth

The economic changes accompanying changes in the Cuban political process over the last two decades have been dynamic, involving significant reversals in development strategies in response to economic fluctuations. These fluctuations appear in turn to have influenced, or at least to have been associated with, the nation's observed fertility patterns.

Carmelo Mesa-Lago (1981:Table 3) has provided a general description of the Cuban economy over the last two decades, as well as various statistical series that help gauge its global performance. Although highly suggestive, these series, shown in Table 41, should be regarded as only approximate since they are based on fragmentary, often incomparable data until the late 1960s and early 1970s. Moreover, according to Mesa-Lago, a particularly serious shortcoming of the series is that for several years, especially in the period since 1967, some of the income data on which the estimates are based have not been corrected for inflation and are also affected by changing methodologies (Mesa-Lago, 1981). Thus, in view of the acute worldwide inflationary pressures experienced since 1973, the data for the 1970s probably overstate economic performance.

During the first few years of the revolution, from 1959 to 1961, a generally favorable economic performance accompanied structural changes. Aggregate demand rose in response to income distribution measures resulting from agrarian and other social and economic reforms (e.g., increased employment, higher minimum wages). Other contributing factors included an expansion in government spending, use of new productive facilities constructed just prior to the revolution, and the early favorable performance of the agricultural sector (Ritter, 1974). However, as a result of higher aggregate demand, domestic and imported inventories were rapidly depleted.

TABLE 41 Economic Growth, 1962-80: Cuba

Year	Gross Material Product (GMP) (in million pesos)	Annual Rate[a] (percent)		Multi-Year Average[a] (percent)
		Total	Per Capita	Per Capita
1962	3,698.2	--	--	
1963	3,736.7	1.0	-1.6	
1964	4,076.4	9.0	6.4	2.7
1965	4,137.5	1.5	-1.0	
1966	3,985.5	-3.7	-5.7	-1.3
1967	4,081.0	2.4	0.5	
1968	4,352.6	6.7	5.0	
1969	4,180.6	-4.0	-5.6	
1970	4,203.9	0.6	-0.9	
1971	4,818.2	14.6	12.8	14.5
1972	6,026.9	25.1	23.0	
1973	6,710.4	11.3	9.4	
1974	7,414.1	10.5	8.9	
1975	8,886.3	19.8	18.3	
1976	8,881.8[b]	-0.1	-1.5	3.1
1977	9,246.0[b]	4.1	2.9	
1978	10,115.2[b]	9.4	8.4	
1979	10,545.1[b]	4.3	3.6	
1980[c]	10,861.4[b]	3.0	2.3	

[a] GMP, in 1962-66 at constant prices, in 1967-80 in current prices. Gross material product includes the production of material goods in agriculture, fishing, mining, industry, and construction and excludes the value of such material services as transportation, trade, and communication related to the production of material goods included in gross social product (GSP), and the value of nonmaterial services such as education, health care, insurance, etc.
Technically, per capita growth rates in GMP cannot be compared over time due to shifts in methodologies and the effect of inflation since 1967.

[b] Author estimate based on the average ratio of GMP/GSP in the previous 10 years.

[c] Goal.

Source: Mesa-Lago (1981:Table 3).

During these early postrevolutionary years, when the capitalist system was rapidly and almost completely reorganized along socialist principles through the collectivization of the means of production, social welfare objectives played a central role in the allocation of national resources. These social objectives involved redistributive reforms geared to reducing social and regional differentials in living conditions and providing access to basic social services. The earliest development strategy, to be implemented during the 1962-65 period, rested at first on a drive toward rapid industrialization of the country through import substitution, as well as reduction of the dependency on sugar through diversification of agriculture and the attainment of self-sufficiency in food production. In addition, there was to be expansion of education, health, and social security services, as well as various agrarian and urban reforms. This period of redistributive reforms, lasting roughly from 1959 to 1964, coincided with a rise in marriage rates (more than doubling between 1959 and 1961); it also coincided with the baby boom period, during which the birth rate increased by nearly 35 percent over its prerevolutionary rate, an increase experienced by all age groups, but especially younger women aged 15-24. As previously noted, this period was also marked by a reduction in the availability of abortion and contraception.

The evidence suggests that the baby boom was produced by the rise in real income. The latter resulted from a series of policies that led to a shift in income distribution; this shift increased incomes and reduced the cost of living and housing, especially for the lower but also the middle classes.

The most significant rural reform, the Agrarian Reform Law of May 1959, included a variety of provisions that particularly benefited former tenants, sharecroppers, and squatters.[27] In October 1963, a second Agrarian Reform law was passed which limited the area of land that could be owned privately to 66 hectares. By 1961, 59 percent of the land still remained in private ownership; by 1963, the government owned 70 percent of the national land, but only 57 percent of the arable land. However, the average annual income of private farmers in the mid-1960s was 2,450 pesos, in comparison with only 800 pesos among agricultural workers on state farms. Despite endorsement of the educational and public health policies of the government, peasant resistance to many of the government's agricultural policies resulted (Dominguez, 1978). Those benefiting most from agrarian reform included squatters and nonsugar farmers through the reduction in land evictions and improved security of land tenure. As noted by Dominguez (1978:463):

> . . . rural educational opportunities improved remarkably; rural public health, more modestly. Rural income also rose faster than urban income during the period. In exchange for relinquishing their political autonomy, the peasants did gain important material advantages, at least until 1975, when new taxes and interest policies cancelled out many of the benefits peasants had enjoyed earlier.

In the urban areas, the most significant income distribution reform was the Rent Law of March 1959. This law provided reductions of 50 percent in the rents of those paying less than 100 pesos per month and 30 or 40 percent for tenants in the higher brackets.

In addition, minimum salaries were raised. According to one official estimate, from January 1958 to January 1961, the proportion of the labor force earning more than 75 pesos a month increased from 51.5 to 60.8 percent, and from 27.2 to 34.2 percent in the rural areas (O'Connor, 1970). It is estimated that within the same time period, wages and salaries increased between 15 and 30 percent through the renegotiation of labor contracts (Ritter, 1974). The income lost by the wealthy was transferred to the less affluent as

> . . . minimum wages and pensions were increased, overall wages [were] raised significantly (as much as 25 to 30 percent), agricultural rents were eliminated while urban rents were reduced by one-half, mortgages were abolished, and the cost of public utilities cut . . . . The policies of expansion of free social services (education, health and social security) and achievement of full employment also resulted in increases of income or disposable income of the poorest strata (Mesa-Lago, 1981:143).

Electricity, water, and telephone service rates were reduced, and important social services, especially in rural health and education, were expanded and provided free. Class and sex barriers to education were reduced through the abolishment of private schools, the incorporation of rural students in urban schools, and the provision of government scholarship aid. All of these factors, to be discussed separately in later sections, produced immediate improvements in real income.

As previously noted, the baby boom occurred in all provinces, but was sharpest in La Habana, Matanzas, and Las Villas, highly urban provinces in central Cuba. Thus urban reforms, lowering the cost of living and promoting social mobility, together with reductions in the urban availability of fertility regulation, may have been more significant factors than agrarian reforms in the early baby boom.

By 1962, however, the development strategy plan began to falter. From 1962 to 1970, aggregate economic performance was poor. This resulted from a variety of factors: the abrupt elimination of market mechanisms through rapid collectivization of the means of production; the loss of highly skilled managerial and professional personnel through emigration; the economic embargo imposed on Cuba by the U.S. and OAS and the shift in economic relations towards the U.S.S.R. and socialist nations; inefficiencies in planning and management in new economic organizations; and the burden of military expenditures for internal defense and subversion abroad (Mesa-Lago, 1981; Ritter, 1974). Moreover, a reduction in sugarcane production, in conjunction with low sugar prices and the rapid importation of industrial equipment, resulted in a severe balance-of-payments problem.

In response, in 1963-64, a new economic strategy was developed reemphasizing sugar production and export as the major source of foreign exchange earnings. Because of difficult economic conditions, in March 1962, the government introduced a food-rationing system, which remains largely in effect today. Levels of consumption, especially of durable consumer goods, were sharply reduced as economic conditions worsened, in order to increase investment. However, the rationing of basic goods and the reduced availability of consumer goods created a growing gap between wages paid and goods for sale, resulting in problems of labor productivity. Thus, in the early 1970s, the work quota was changed, linking worker productivity to remuneration and abandoning moral incentives, as discussed more fully in the section below on income distribution.

The goal for the 1970 sugarcane harvest was set at 10 million tons of sugar, necessary for the reduction of the foreign debt, further economic development, and improvement of consumption levels. Although a record was set, this goal was not attained. Moreover, the overcommitment of labor and other economic resources to the harvest disrupted the rest of the national economy, as males were shifted into agriculture and women were recruited to fill their positions (Ritter, 1974).

As noted in Table 41, aggregate economic growth rates in various years during the 1962-70 period were negative; on a per capita basis, output during this period was probably stagnant. On the other hand, standards of living for the marginalized social classes improved during the 1960s as wealth from upper-income groups was transferred to the poor and middle classes and as social services began to expand.

In the first half of the decade of the 1970s, Cuba's economic performance was considerably improved, and economic growth rates were exceptionally high compared to the poor performance in the 1960s. The high rates of growth during 1971-75 were largely the result of record-high sugar prices in international markets, the greater efficiency of the new model of economic planning, returns to previous investments in human and physical capital, reduced defense needs, increasing Soviet subsidies, and the postponement of payments on debts owed to the Soviet Union. In addition, an increased flow of credit from market economies resulted from the easing of trade restrictions previously placed on Cuba by the U.S. and OAS. Sugar prices on the international market soared from 4 cents a pound in 1970 to 65.5 cents in 1974, and hard currency receipts from sugar sales in the free market increased. Levels of living improved during the period as the greater availability of foreign exchange permitted the importation of consumer goods, automobiles, and household appliances, as well as capital goods from Western economies and the Soviet Union.

The worsening economic picture toward the end of the decade can be traced to a sharp drop in sugar prices in the mid- to late 1970s and reduced tobacco, sugar, and swine production due to plant and animal diseases, resulting in a deterioration in terms of trade with the West. Although the volume of exports was sustained, Cuba earned substantially less foreign exchange than in the 1970-75 period. In addition, the absence of production norms and quality controls, labor absenteeism, and the expense of overseas military involvements and new domestic defensive organizations contributed to the economic setbacks (Mesa-Lago, 1981). Dominguez (1981:49) concluded that "even the most moderate adjustments for inflation imported from the international economic system would drastically reduce the real growth rate in four of the last five years"; that rate was estimated by Cuba as 4 percent for 1976-80, one-third lower than originally targeted (Latin America Weekly Report, February 20, 1981).[28]

Income Distribution

As noted above, the early years of the revolution saw a swift redistribution of income and wealth. In relative terms, this early income transfer disproportionately benefited the least privileged strata, although middle-income groups also benefited. Between 1962 and 1973, a further but far less dramatic shift in income took place. Crude estimates of these income distribution patterns are shown in Table 42. As noted in the table, the share of personal income received by the poorest 40 percent of the population nearly tripled between 1953 and 1962, from 6 percent in 1953 to 17 percent in the early 1960s, rising

TABLE 42 Estimates of Income Distribution, 1953-73: Cuba

Per Capita Income Quintiles[a]	Family Income		Personal Income		
	1958	1962	1953	1962	1973
0-20	5.7	9.5	2.1	6.2	7.8
21-40	8.9	12.2	4.1	11.0	12.5
41-60	12.5	13.5	11.0	16.3	19.2
61-80	18.3	18.3	22.8	25.1	25.5
81-100	54.6	46.5	60.0	41.4	35.0
Total	100.0	100.0	100.0	100.0	100.0

[a] Income quintiles are ranked from lowest to highest.

Sources: Family income: MacEwan (1981:Table A.1.1). Personal income: Brundenius (1979:Table 12). See also Mesa-Lago (1981: Table 37). Original 1962 personal income figures are revised in Brundenius (1981:Table 6).

slightly to 20 percent by 1973. The total income share of middle-income groups, according to personal income estimates, rose from 34 percent in 1953 to 41 percent in 1962, and continued to rise somewhat until 1973 (45 percent). The data on family income indicate similar trends.

It is worth noting, first, that these estimates do not take into account the regional equalization of free social services (health, education, and other services), which were greatly expanded after 1959. Since access to these services is not dependent on level of income, low-income groups benefited disproportionately from these changes. Second, the income distribution figures do not consider that, given the prevailing rationing system and subsidizing policies, the prices of many basic items in state stores remained below their real cost over many years. Third, the income distribution figures do not convey the change in the volume of income being redistributed, or the growth of gross domestic product in the immediate postrevolutionary era in contrast to the period of the mid-1960s, when it may have declined in absolute size. Thus, in real terms, the transfer of income from rich to poor and middle-income groups would appear to have been more substantial than that suggested by Table 42, especially during the early revolutionary period.

By 1970, however, it became evident that income redistribution measures were beginning to have adverse effects, impairing the growth of the Cuban economy. Expenditures for social programs increased the size of the foreign debt. Policies of full employment were maintained at the expense of lower labor productivity and higher absenteeism (MacEwan, 1981). In 1971, therefore, the Cuban government initiated a change in government policy labeled as the Soviet Economic Reform Model (Mesa-Lago, 1981). One of the principal aims of this policy change was establishment of a system of material incentives to combat absenteeism and raise labor productivity. Wage subsidies and programs of labor mobilization were curtailed, and a Soviet-type system of performance quotas and more sharply differentiated wage scales was introduced. Charges for utilities, formerly provided free, increased availability at higher prices of nonessential consumer goods, tighter domestic budgets, and even some reemergence of unemployment resulted.

The 1980 wage reform introduced further monetary incentive schemes. Under this new system, wages were tied to productivity, overfulfillment of work norms, and work under difficult conditions. In addition, piecework payment methods were applied to the sugar and food ministries.

The impact of these policies can be assessed only indirectly. Brundenius (1981) concludes that income differentials had narrowed considerably by 1973 and may have stabilized. That year, the average agricultural wage was 1,416 pesos per year, approximately 93.5 percent of the national average and 88 percent of the industrial average. By 1978, however, the income gap among the three sectors had again increased, with the average agricultural wage equaling approximately 81 and 73 percent, respectively, of the national and industrial averages.

In conclusion, it appears that income redistribution, which stimulated higher fertility in the early 1960s, stabilized during the early 1970s. By the late 1970s, income differentials between agricultural and industrial workers had probably widened. The effect of the 1980 wage reform and incentive payment scheme cannot be assessed. Income differentials and regional disparities in income still remain in Cuba, although they are far less dramatic than those of the prerevolutionary era, especially given regional equalization of free social services, high employment levels, social security, and the prevailing rationing system. On the other hand, countering the egalitarian tendencies promoted by rationing, price supports, and free social services are the operation of black and officially sponsored "parallel" markets and periodic price increases, discussed more fully below.

Levels of Material Consumption

As indicated above, in relation to existing demand during the last two decades, Cuba has experienced a shortage of consumer goods resulting from a complex interplay of many factors: inefficiencies of the Cuban economy; priority investment of national resources in productive areas (roads, port and agricultural facilities, factories) at the expense of current consumption; and a more equal distribution of income and the consequent greater demand for goods. Rationing subsidies and price fixing have been used partly to ensure a more equitable distribution of basic necessities and consumer goods in short supply and partly to provide a substitute for the free play of market forces (Dominguez, 1978; Mesa-Lago, 1981; Ritter, 1974). The inevitable result has been a flourishing black market in which many of the goods in short supply can be purchased, but at very high cost.

In 1973, both to counteract the black market's undermining effects on moral and ethical values and to increase labor productivity, the government established a parallel market system. In this system, many consumer goods unavailable through rationing, or quantities of rationed goods beyond established limits, could be purchased, but at highly inflated prices (Mesa-Lago, 1981). The government first raised prices on alcoholic beverages, then on cigarettes and tobacco products and gasoline. Prices for everything, with the exception of some food, medicine, and essential clothing, were raised and became unsubsidized by the mid-1970s as a result of increased production. (Prior to this time, the prices of most consumer goods had been subsidized by the government.)

Tables 43 and 44 provide a limited perspective on the extent of the rationing system and on prices of various goods in the rationed, parallel, and black markets during different time periods. Although a number of consumer staples have been rationed and marketed at subsidized prices, rations may have been insufficient to satisfy family needs. Most essential clothing has remained rationed, for example, a pair of pants, a skirt, a blouse, a dress, a pair of leather shoes, and four meters of fabric annually. Monthly allocations of food and other items are, in some cases, quite low, especially if one considers some of the traditional Cuban consumption preferences. Moreover, regional differences in food consumption were still particularly marked in 1978 and 1979, the only years for which data are available: per capita food consumption in Havana was nearly one-third higher than the national average and 79 percent higher than in the poorest province, Guantanamo (Brundenius, 1982).

In line with the increasing emphasis on economic incentives, the government also established the small farmers' free market (*mercado libre campesino*) in 1980. Under the aegis of the local authorities (*poder popular*), small landholders or cooperatives of private farmers are permitted to sell their produce to the public in new markets once their commitment of sales to the state has been fulfilled. Originally, the state did not interfere with the prices, which often fluctuated greatly, but were usually below the previous black market prices. As a result of the new policy, fruit, vegetables, chicken, and

TABLE 43 Monthly Per Capita Quotas of Selected Rationed Consumer Goods (in pounds), 1962-79: Havana, Cuba

Selected Rationed Goods	1962	1969	1971-72	1978-79[a]
Meat[b]	3	3	3	2.5
Fish	1	2	4	free[c]
Rice	6	4	3-6	5
Beans	1.5	1.5	1.5-3	1.25
Tubers	14	9	n.a.	n.a.
Fats	2	1	2	1.5
Eggs (units)	5	15	15-24	free
Butter	0.125	0.125	free	free
Coffee	1	0.375	0.375	0.125
Milk (canned)[d]	6	2	3	3
Sugar	free	6	6-4	4
Bread	free	15	n.a.	15
Cigarettes (package)	free	4	4	4
Gasoline (gallon)	free	n.a.	n.a.	10
Detergent (medium pkg.)	1	1	n.a.	0.5
Soap (cake)	2	2.5	n.a.	1.5
Toilet paper (roll)	free	1	n.a.	1
Toothpaste (sm. tube)	1	1	n.a.	0.33
Cigars (units)	free	2	4	4
Beer (bottle)	free	1	free	free

[a] Also free in 1978-79 were macaroni, spaghetti, butter, and yogurt; cakes and vegetables (according to season); and bread (after 4 p.m.).

[b] Beef; if not available, chicken is provided.

[c] Small fish; seafood has not been available for more than a decade.

[d] Children under age 7 have a daily ration of half a liter of fresh milk; adults over age 65 receive six cans of condensed or evaporated milk monthly.

Source: Mesa-Lago (1981:Table 41).

some meat, normally in scarce supply in shops, became more widely available (Latin America Weekly Report, July 18, 1980). Recently, however, the operation of these free markets has been curtailed because of government claims that they have encouraged profiteering.

By the early to mid-1970s, several goods whose production had been very restricted in the 1960s were reintroduced at substantially higher prices. These included cosmetics, perfumes, cameras, and electrical appliances--radios, televisions, and refrigerators.[29] However, many of these goods--some electric appliances, for example--could only be purchased at high parallel

TABLE 44 Prices of Selected Goods (in pesos), 1977-78: Cuba

Goods	Official		
	Rationing	Parallel Marketing	Black Market
Food (pounds)			
Beef	0.44-0.55		8
Ham	1.30-2.70	6.00	10
Rice	0.21		2
Beans	0.18-0.20	1.25	2-3
Coffee	2		10-20
Fats	0.22-0.30		3
Manufactures			
Rum (bottle)		7.50-12	25[a]
Cigarettes (package)	0.20	1.60-2.00	1[a]
Cigars (one)	0.12	1.50	2[a]
Shoes (pair)	3.50-10.50		70
Fabric (meter)	0.40-2.50	1.50-10.50	30
Gasoline (gallon)	0.60	2	1
Consumer Durables[b]			
TV (black and white, 17")		650-900	
Refrigerator (sm., med.)		650-850	
Record player		350-1,200	
Car (Soviet Fiat)		4,500	
Car (U.S., 1950s)			5,000-15,000

[a] Goods of higher quality than those available through rationing or the parallel market.

[b] Most available only through quotas to state enterprises; a few available through the parallel market.

Source: Mesa-Lago (1981:Table 42).

market prices, which far exceeded the average monthly Cuban wage in 1978 of 140 pesos.[30]

Moreover, there have been a number of pricing policy reversals since the mid-1970s designed to stimulate worker productivity. Under the new policies, charges have been levied for many services and goods that for years had been provided free or at very reduced cost. These include food, clothing, and footwear for children in day-care facilities (Recarte, 1980); electricity and water; long-distance travel and vacation plans; and meals in restaurants, as well as in worker canteens (Dominguez, 1978). Housing rents have also been increased, but remain set at a maximum of approximately 10 percent of income.

In addition, in late 1981, reforms were announced that increased the price of rationed goods such as milk, rice, beans, sugar, cooking oil and fat, beef, chicken, cloth, soap, cigarettes, and gasoline. The prices of these goods still remain moderate since government subsidies continue, but at a lower rate. In addition, the reform introduced low admission charges to museums, zoos, art galleries, and botanical gardens. Plans were also announced for sharp increases in bar, cafeteria, and restaurant prices; in many cases, proposed prices were to have doubled, although the increases were officially to have been in the range of 11 to 30 percent. However, opposition by trade unions, mass organizations, and the Havana Provincial Assembly of People's Power has led to a suspension of these latter increases pending further study by a commission that includes representatives of unions and mass organizations; other price increases are now in effect (Latin America Regional Reports: Caribbean, January 15, 1982).

Complete itemization of the costs of children assumed by the state and by parents is impossible. Despite price supports and free social services for health and education, during the 1970s only about 3 percent of primary school children received scholarships covering most of their needs (food, clothing, and lodging); this was similar to the level of scholarship aid during the 1960s. Sliding-scale charges for the use of child care centers have also been levied since the mid-1970s to discourage admission of children followed by high absenteeism. Moreover, food, clothing, and footwear for these children and school uniforms for scholarship students must now be purchased. Government assistance has instead been directed to intermediate levels of education. In 1979-80, 38 percent of basic secondary school students, 61 percent of preuniversity students, and 47 percent of technical and professional students were receiving scholarships; the proportion of all students receiving scholarships (excluding preschool, juvenile, special education, and adult education) increased from 8.5 percent (167,592 scholarships) in 1970-71, to 13 percent (303,899 scholarships) in 1974-75, to 20 percent (569,965 scholarships) in 1979-80.

Reductions in infant mortality and the high life expectancy achieved in Cuba, examined more fully below, indicate that the basic food, clothing, and health needs of the population are being met through the health system, rationing, and state-subsidized prices in the parallel market. Although minimum wage scales and unemployment insurance are sufficient to maintain an adequate standard of living, parents must provide what is not readily accessible through the rationing system, and Cuban households, like those in all other countries, must allocate expenditures among children and other goods. There may be a link between these economic factors and the low fertility desires expressed in the 1979 National Demographic Survey and discussed above, especially among lower-income groups more affected by the rise in the cost of living. These lower desires may be partly traceable to high prices charged in parallel and especially black markets on nonessential goods or quantities of rationed goods beyond established limits, to charges for services formerly provided free, and to stabilization and probable reversals in income differentials since 1973.

Empirical support for this economic influence on fertility decline is scattered and inferential. One exploratory study, recently published in a Cuban public health journal, provides extremely limited evidence (Gonzalez Perez, 1981). The study was conducted between December 1978 and June 1979, while its author was working in the sugar harvest in a rural area with a group of young male workers, all from the city of Havana. Only one-third lived in nuclear families, and one-third had employed wives; the majority had only one child. Of the 15 married men in this small sample, 13 indicated that they did not want more children because of housing problems; 12 also gave insufficient income as a reason. Of the fathers earning 150 pesos a month or less (below average wage), 73 percent stated that they did not earn enough to satisfy the needs of their families, although the number of household members supported was not specified. Marital instability was cited by 2, and difficulties in obtaining space in child care centers by 2 others. Among the 10 single men also queried, the majority cited the housing shortage as their primary reason for postponing marriage.

There are no data on the factors underlying fertility desires other than those in the 1979 National Demographic Survey; data on ideal family size collected in the early fertility surveys of the 1970s have never been published (Alvarez Vazquez, 1975). However, further evidence on economic conditions is provided by a few independent studies conducted in Cuba in the late 1960s, involving detailed field work (Butterworth, 1980; Lewis et al. 1977a, 1977b). Although food rationing had been in effect for 20 years, regional differences in food consumption still existed in 1978 and 1979, the only years for which data are available. Similarly, the main sources of tension reported by Cuban psychiatrists are problems posed by transport, housing, and food shortages, weakened family ties, and the boredom of Cuban life (Pisani, 1980). In a survey of recent emigres arriving in the United States in the early 1970s, 96 percent of the sample stated that one of their reasons for leaving Cuba was "a lack of future" in fulfilling social and economic aspirations for self and children (Portes et al., 1977:17).

Old Age Security

Cuba's postrevolutionary policies, such as those of full or nearly full male employment, age restrictions on employment, and a more equitable income distribution, have reduced the economic value of children as labor sources, especially in rural areas. Their value as sources of old age security has also been reduced by the social security and pension policies of the government. As Mesa-Lago (1981:169) notes:

> Social security has improved significantly under the revolution, both in terms of overall coverage and distribution. In 1958 about 63 percent of the labor force was covered for old age, disability, and survivors insurance while all the labor force was covered against occupational accidents and diseases, and female employees had maternity insurance. At the eve of the revolution, Cuba had the second highest social security coverage in Latin America. Protection, though, was rather unequal because there were fifty-two autonomous social security funds--each with its own insured group, legislation, financing sources, and benefits. High status occupations normally had the best funds and conditions, while low status occupations had the worst; for instance, minimum pensions fluctuated from 30 to 200 pesos a month and maximum pensions from 60 to 400 pesos a month. There was neither national health insurance nor unemployment compensation.

The figures in Table 45 show clearly the expansion of the social security system, even after allowing for population growth. In fact, the increase in coverage for the poorest strata of the population is actually somewhat greater than these figures suggest since many former recipients of national pension funds have emigrated to the United States and other countries. A disproportionate number of these emigrants were in or near retirement age: approximately 12 percent of emigrants between 1960-67 and 1970-79 were age 60 and above (Comite Estatal de Estadisticas, 1980).

The average monthly pension per capita has only risen from 62 pesos per month in 1959 to 65 in 1978. For each additional year of employment, increments of 1 percent are added to pensions, to a maximum of 5 percent. How-

TABLE 45 Social Security Expenditures and Pension Per Capita (in current pesos), 1959-78: Cuba

Year	Total Social Security Expenditures[a] (in million pesos)	Subsidies and Welfare[b] (in million pesos)	Pension[c] (in million pesos)	Number of Pensioners[d] (in 1,000s)	Pension per Capita[d] (in pesos)
1959	114.3		114.3	154	740
1960	124.3		124.5	170	732
1961	150.5		150.5	210	727
1962	151.9		151.9	213	713
1963	177.0		177.0	250	708
1964	235.7	39.1	196.6	280	702
1965	249.8	41.5	208.3	298	699
1966	247.0	41.7	205.3	298	689
1967	245.3	38.0	207.3	301	688
1968	308.9	85.0	223.9	334	670
1969	393.9	118.2	275.7	342	806
1970	440.7	154.2	286.5	363	790
1971	486.5	175.4	311.1	394	790
1972	514.5	170.5	342.9	432	796
1973	554.4	171.1	383.3	470	816
1974	553.4	136.2	417.2	507	823
1975	585.4	137.2	448.2	544	824
1976	609.4	136.2	473.2	581	814
1977	626.0	134.5	491.5	629	781
1978	647.6	140.1	507.5	652	778

[a] Only monetary payments; excludes costs of health care provided by the Ministry of Health.

[b] Includes payments to the partially disabled; those suffering illness and accidents, both common and occupational; maternity leave and female employment; former landowners; workers who are studying; relatives of military recruits; and those who cannot afford the cost of meals in workers' cafeterias.

[c] Includes pensions for old age, disability, and survivors.

[d] 1960-67 figures are Mesa-Lago's estimates checked with the State Committee on Labor and Social Security.

Source: Mesa-Lago (1981:Table 45).

ever, employment among the elderly has declined during the 1970s. Retirement became more flexible by 1971, and the number of individuals retiring increased sharply between 1972 and 1976. The average monthly pension is considerably lower than the average monthly salary (140 pesos per month in 1978); moreover, as noted above, shortages exist in goods at subsidized prices in the conventional market, and high prices are commanded in the parallel and black markets. However, health care is free, and 63 homes for the aged are provided by the state, although intergenerational housing arrangements are still comparatively common because of the housing shortage.

No data are available directly linking old age security to fertility decline. It would appear, however, that the economic value of children as a source of old age security has been considerably reduced, although not completely eliminated, by the social security and pension policies of the government.

Male Employment

The evolution of employment policies is crucial to a study of the determinants of fertility. Social policies oriented to maintaining full or nearly full male employment, in conjunction with age restrictions on employment, may have produced important changes in the perceived economic value of children, especially in rural areas.

In prerevolutionary Cuba, unemployment and underemployment were severe. In the late 1950s, according to some estimates, 10 percent of the labor force could not find work at the peak of the seasonal cycle of economic activity, and 23 percent were unemployed during the worst of the slack season (CEPAL, 1980). Beginning in the early 1960s, a number of measures were implemented that over time have helped to ease the unemployment problem. As a result, unemployment rates (see Table 46) fell from 13.6 percent in 1959, to 6.5 percent in 1965, to 2.9 percent in 1969; by 1970, unemployment had reached its lowest official recorded level of 1.3 percent, although problems of labor productivity and labor shortages had become more apparent. The goal of full male employment culminated in 1971 with passage of the "anti-loafing" law, establishing compulsory employment for adult males. Under this law, the minimum age of employment is 17 for males and females; retirement age is 55 for females and

TABLE 46 Labor Force, Female Employment, and Unemployment, 1957-79: Cuba

Year	Labor Force (in 1,000s)[a]		Unemployment (in 1,000s)		Percent	Number of Females Employed (in 1,000s)		Percent Female in the Labor Force		
1957	2,214		275		12.4	277		12.6		
1958	2,218		262		11.8	290		13.1		
1959	2,551		307		13.6	--		--		
1960	2,276		269		11.8	--		--		
1961	2,338		242		10.3	--		--		
1962	2,401		215		9.0	--		--		
1963	2,431		198		8.1	--		--		
1964	2,456		185		7.5	--		--		
1965	2,490		163		6.5	--		--		
1966	2,508		155		6.2	--		--		
1967	2,549		135		5.3	--		--		
1968	2,579		110		4.3	407		15.8		
1969	2,608		75		2.9	435		16.7	22.9[b]	
1970[c]	2,638	2,631	34	35	1.3	474	475	18.0	23.8	
1971	2,652		55		2.1	475		17.9	22.9	
1972	2,680		64		2.4	479		17.9	21.8	
1973	2,795		84		3.0	535		19.1	24.0	
1974	2,869		111		3.9	590		20.6	24.0	
1975	2,923		90		3.1	647		22.1	28.0	
1976	2,974		85		2.8	705		23.7	--	
1977	3,075		60		2.0	735		23.8	--	
1978	3,140		40		1.3	761		24.2	30.0	
1979[c]	--	3,458	--	59	--	--	946		31.0	28.9

[a] Cuba does not regularly publish data on the total labor force or unemployment. The available data are based solely on the state civilian employment and private employment, omitting the armed forces, police, and security personnel. The data on labor force represent a reconstruction of the labor force, including state, civilian, and military employees, private employees, and the unemployed (Mesa-Lago, 1980).

[b] Second series on percentage female in the labor force 1957-75 (Dominguez, 1978:Table 12.4; Benglesdorf and Hageman, 1974). Data for 1978-79 supplied by the Frente Feminino, 1980. According to their figures, 778,000 women were in the labor force in 1978 and 800,000 in 1979. The labor force is defined as the number of people engaged in salaried work during the week preceding the survey. The data for 1969-73 and 1978-79 refer to nonmilitary employees of the state; data for 1974-75 include all employment.

[c] Unemployment was calculated as the difference between the economically active population and the population defined as in the labor force, that is, having worked during the week preceding the survey.

Sources: Unless where otherwise stated, Mesa-Lago (1981:Tables 30, 32). Data for 1970 and 1979, Comite Estatal de Estadisticas (1981d).

60 for males. All male citizens from 17 to 60 who are fit to work and are not attending any of the schools in the national system of education must seek employment or join the armed forces at age 17.

The year 1970 is important in an analysis of Cuba's employment policies since it marks a shift from the earlier concept of the "new man," dominated by moral incentives, to an emphasis on monetary incentives for work produced (Mesa-Lago, 1981; Recarte, 1980). This shift followed the unsuccessful attempt in 1970 to produce ten million tons of sugar. According to Mesa-Lago (1981:192-193), a number of previous policies were reversed:

> . . . material incentives [were] substituted for moral incentives; wage differentials [were] expanded; wage scales were reintroduced and connected with work quotas; overtime and production bonuses were reinstalled; expansion of free social services was frozen and in some cases reversed; durable consumer goods became distributed mainly based on work performance . . . . In the current stage, not only has there been a return to the principle of distribution according to work, but also an attempt to reestablish the connection between labor reward and enterprise productivity and profitability.

This increased labor productivity conflicted with Cuba's full employment policies. The solution to this dilemma during the 1970s was a series of measures that, in effect, tended to reduce the size of the domestic labor force. Retirement became more flexible in 1971, and the number of individuals retiring increased sharply between 1972 and 1976.

In 1973, the Confederation of Cuban Workers agreed to modify regulations originally passed in 1967 when the manpower deficit was acute; these regulations had reserved for women certain types of service jobs so that men could be transferred into more physically strenuous work, especially in agriculture. In 1976, the number of jobs from which women were barred for health or safety reasons was also expanded, opening these positions to men. In addition, the armed forces were expanded from an estimated 185,000 men in 1974, at the time of peak unemployment, to 230,000 in 1978. Finally, professionals in abundant supply, such as teachers, physicians, dentists, and related health personnel, were exported to assist developing nations and to generate revenue for the state (Mesa-Lago, 1981).

By the end of the 1970s, however, a labor surplus existed, with unemployed workers receiving 70 percent of their wage while waiting for job reassignment. In 1979, an estimated 59,000 males were unemployed.[31] Since October 1980, all employees have been required to sign individual contracts with the state enterprise for which they work. Previously, most workers with steady jobs simply became part of a permanent roster of employees without a written contract defining their legal position.[32]

Table 47 shows the distribution of the male employed population by economic sector in 1979. Males were concentrated in the agricultural and mining sectors (28.3 percent of all male employees), industry (22.9 percent), construction (10.6 percent), and transportation and communication (7.9 percent), with the remainder distributed among the other sectors. As noted in Table 48, which presents the distribution of the male employed population by occupational status, one-third of Cuban male laborers were classified as nonagricultural; approximately 20 percent were agricultural laborers, 20 percent were service laborers, and 28 percent were in professional, technical, managerial, and administrative positions.

A perspective on the association between male occupational status and fertility is offered in Table 49 and Figure 17, which show differentials in total fertility rates over time by occupational status of the head of household, cross-classified by wife's educational attainment. The data on current occupation collected in the 1979 National Demographic Survey are classified into four categories: agriculture; manufacture and production of goods; service activities; and professional, managerial, and administrative activities. Data on total fertility rates, calculated through use of the own-children methodology, are presented for two time periods--one of high fertility (1964-66) and one of low fertility (1976-78). As noted in the first two columns of the table, the decline in total fertility rates occurred within all occupational categories, but was especially sharp among agricultural workers (both laborers and small landholders), who evidenced a decline in total fertility of 3.4 to 3.5 children during the time period in question. Declines in the other groups were lower, ranging from 2.8 children among production workers and 2.5 among service

TABLE 47 Employed Population, by Sex and Sectoral Economic Activity, 1979: Cuba

Sectoral Economic Activity	Male		Female		Employment Distribution by Sex (percent)[b]	
	Absolute (in 1,000s)	Percent[a]	Absolute (in 1,000s)	Percent[a]	Male	Female
Industry	497,2	22.9	154,7	17.9	76.3	23.7
Construction	230,0	10.6	26,5	3.1	89.7	10.3
Agriculture, mining	614,5	28.3	101,5	11.7	85.8	14.2
Transportation, communication	171,3	7.9	31,4	3.6	84.5	15.5
Commerce	154,8	7.1	110,7	12.8	58.3	41.7
Other productive activities	4,5	0.2	3,2	0.4	58.2	41.8
Services, public and private	62,8	2.9	31,9	3.7	66.3	33.7
Education, culture, and art	147,3	6.8	226,5	26.2	39.4	60.6
Public health, social security, sports, and tourism	55,3	2.6	93,4	10.8	37.2	62.8
Other unproductive activities	232,0	10.7	84,8	9.8	73.3	26.8
Unspecified activities	134,6		81,4		65.5	34.5
Total	2,324,3	100.0	946,0	100.0	71.1	28.9

[a] Percent distributions exclude persons employed in unspecified activities.
[b] Percent distributions refer to the employment distribution by sex within each sectoral activity.

Source: Comite Estatal de Estadisticas (1981d:Table 16).

TABLE 48 Population Employed, by Sex and Occupation, 1979: Cuba

Occupation	Both Sexes		Male		Female		Employment Distribution by Sex (percent)	
	Number (in 1,000s)	Percent	Number (in 1,000s)	Percent	Number (in 1,000s)	Percent	Male	Female
Professional and technical	534,4	17.5	248,9	11.4	285,5	32.6	46.6	53.4
Managerial	111,1	3.6	92,7	4.3	18,4	2.1	83.4	16.6
Administrative laborers	198,8	6.5	64,2	3.0	134,6	15.4	32.3	67.7
Services laborers	609,1	20.0	360,8	16.6	248,3	28.4	59.3	40.8
Agricultural laborers	614,2	20.1	544,5	25.0	69,7	8.0	88.7	11.4
Nonagricultural laborers	985,7	32.3	867,2	39.8	118,5	13.5	88.0	12.0
Unspecified	217,0	--	146,0	--	71,0	--	67.3	32.7
Total	3,270,3	100.0	2,324,3	100.0	946,0	100.0	71.0	28.9

Source: Comite Estatal de Estadisticas (1981d:Table 14).

TABLE 49 Total Fertility Rates, by Occupational Category of Head of Household and Wife's Educational Attainment, 1964-66 and 1976-78: Cuba

			Education							
	TFR		0-3		Primary 4-5		6		Intermediate	
Occupational Category	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78
Agriculture[a]			7.2	3.7	5.6	3.6	5.2	2.5	4.8	2.0
Laborers	6.3	2.9								
Small holders	5.8	2.3								
Manufacture and production of goods[b]	4.9	2.1	6.3	3.0	5.2	3.4	4.5	2.7	3.7	1.7
Service activities[c]	4.5	2.0	6.0	2.8	5.1	2.8	4.2	2.6	3.3	1.8
Professional, managerial, and administrative activities[d]	3.6	1.9	--	--	5.3	3.1	3.9	2.8	2.9	1.5

[a] Persons employed in the agricultural sector, mining, fishing, and hunting, including the unremunerated family worker. The group is subclassified into state and private salaried workers; small agricultural landholders; and cooperative workers.

[b] State and private salaried workers employed in the production and manufacture of goods (including transportation), in which physical work predominates (includes agriculture, mining, fishing, and hunting activities).

[c] State and private salaried workers employed in services (communication, commerce, food, sanitation and cleaning, personal services, and public protection, etc.) and unclassifiable workers.

[d] State workers employed in occupations in which intellectual work predominates (includes managers, planners, engineering and technology, education, research, culture and art, public health, journalism).

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 16).

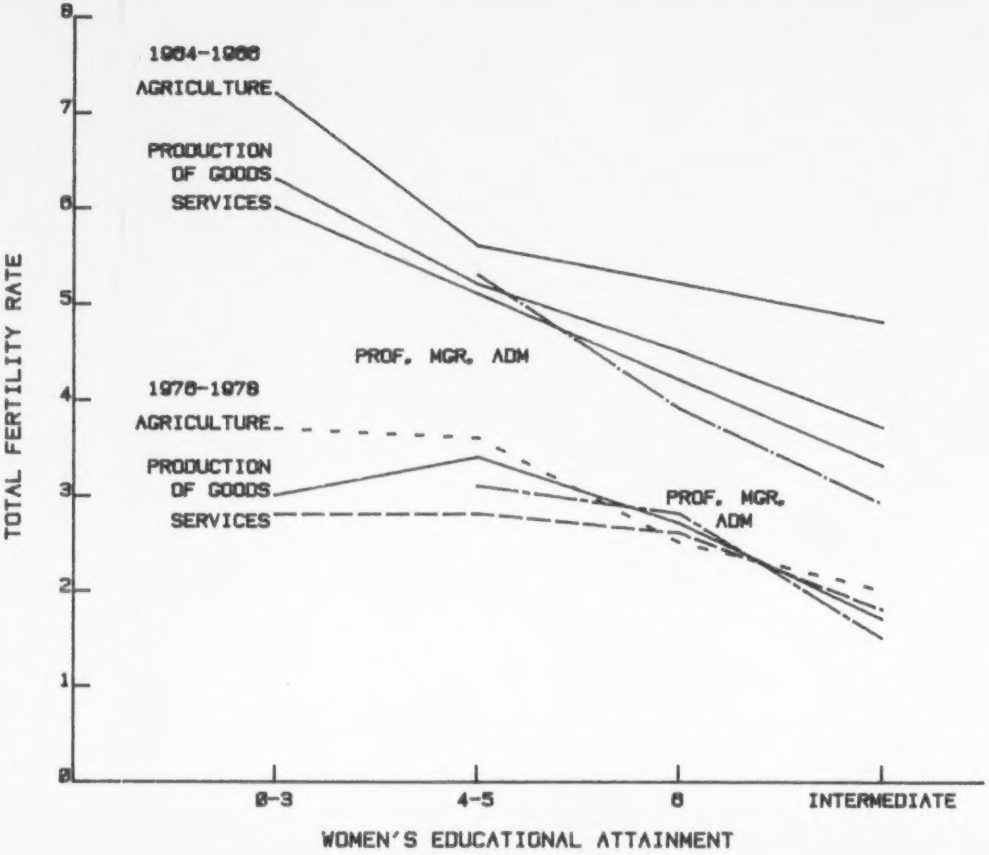


FIGURE 17 Total Fertility Rates, by Occupational Category of Head of Household and Wife's Educational Attainment, 1964-66 and 1976-78: Cuba

workers to 1.7 among professional, managerial, and administrative workers. By 1976-78, there was comparatively little difference in fertility by occupational category (TFRs ranging from 1.9 to 2.3), with the exception of agricultural laborers, who still evidenced the highest fertility (TFR of 2.9).

The same data cross-classified by wife's educational attainment demonstrate similar trends. In 1964-66, the agricultural occupations within every educational group had the highest fertility, ranging from 7.2 children among those with less than 3 years of education to 4.8 among those with intermediate levels of education. By 1976-78, this differential remained only within the occupational category of 0-3 years of education. Heads of households engaged in agriculture whose wives had 0-3 years of education had 3.7 children, in comparison to 3.0 among production workers and 2.8 among service workers. At the other educational levels, differences are considerably narrowed (.3 to .5 children in 1976-78); within one educational category (primary school completed), agricultural laborers and landholders had the lowest fertility.

As discussed further below, rural fertility was also higher than urban at the beginning of the time period; however, by the late 1970s, rural-urban differentials remained only among women with the lowest educational attainment. Thus, occupational category does not appear to be a significant differential in Cuban fertility. Differentials in fertility that do exist are explained by differences in educational level and, to a lesser extent, by rural-urban differentials (Comite Estatal de Estadisticas and CELADE, 1981).

Female Employment

Cuban women had achieved a relatively high status prior to 1959. They were granted the right to vote in 1934, while the very progressive 1940 constitution prohibited discrimination on the basis of sex and required equal pay for equal work. According to the 1953 census, there were somewhat fewer female than male illiterates (21 percent in comparison to 26 percent among males), more females than males over age 10 who had received formal schooling (77 percent in comparison to 72 percent among males), and a high proportion (32 percent) of the economically active female population employed in white-collar occupations.

Since 1959, various government policies have further improved the status of women in accordance with the economic and social objectives of the government. These policies have included literacy and adult education programs, mobilization for volunteer work, and incorporation of women into the full-time labor force. These efforts have successfully modified many previous social relationships, although there has been some cultural resistance. For instance, male opposition to state interference in family relationships, such as boarding schools for children and female employment, has been cited as an important factor in emigration from Cuba during the late 1960s (Fox, 1973).

It is within this complex context of economic policy that female labor force participation should be analyzed. During the 1960s, when the social goal of reducing male unemployment received priority, the incorporation of women into the labor force was not regarded as crucial. As labor shortages began to appear during the mid- to late 1960s, women began to be used increasingly as a reserve labor force pool, mobilized for short-term, voluntary work, with efforts made to modify cultural attitudes toward women's roles and employment. As part of its activities, the Federation of Cuban Women (FMC) broadened its functions in 1964 to form volunteer women's work brigades on a regular basis. The FMC reported that between 1972 and 1973, for instance, there was an increase from about 76 million to more than 95 million hours of voluntary work by women (Benglesdorf and Hageman, 1974). A wide variety of activities were included in this voluntary labor, including cane cutting, literacy and adult education programs, health activities, and work in various mass organizations.

Although women were used primarily as reserve labor during the 1960s, notable shifts occurred in their areas of employment, coinciding with increases in social services and commerce and decreases in personal services. According to the 1970 census, only 18.3 percent of the economically active population aged 15 and older was female (approximately 480,727 women), a rate exceeded by many other Latin American countries and only a small increase from the 1953 figure of 13 percent (256,440) among those aged 14 and older (Republica de Cuba, 1955, 1975). After social services, in which 42 percent of the economically active women were engaged in 1970 (predominantly in health and education), the only other important sectors of employment were commerce and manufacturing (textiles, food, tobacco, and handicrafts). The proportion of women employed in commerce had increased from 7.9 percent in 1953 to 19.7 percent in 1970, reflecting the government policy mentioned above designed to transfer males employed in commerce to other sectors of the economy, especially agriculture, and replace them with females. The proportion employed in social services had increased from 29.2 percent to 42 percent, while the proportion employed in personal services had declined from 35.5 percent in 1953 to 3.3 percent in 1970. This shift from personal to social services reflects an expansion of health and education; socialization of the remaining small businesses in 1968; and a reduction in the incidence of private domestic service, as well as its omission from the 1970 census definition of economic activity (Alvarez and Rodriguez, 1978). Female employment in agriculture, which is usually underenumerated, increased from 14,600 in 1953 to 38,649 in 1970; however, it still played only a minor role in total female labor force participation (less than 6 percent in 1953, 8 percent in 1970). Given this shift toward higher-status social service employment, the opportunity costs of female economic activity can be expected to have risen.

Table 50 presents a variety of data pertaining to age- and marital-status-specific female economic activity. As noted, in 1970 only 18 percent of all women aged 14 and above were economically active. The low proportion employed among women aged 15-19 reflects enrollment in secondary education. Employment is instead concentrated in the reproductive years: approximately one-fifth to one-fourth of the women in the five-year age groups from 20 to 44 were economically active in 1970. The proportion economically active drops sharply after age 50; the low rates for women aged 60-64 reflect social security provisions.

Although not shown in tabular form, the proportion of women economically active in 1970 was higher in urban than in rural areas, except in the age group 10-14. This is perhaps due to earlier abandonment of studies in rural areas (CELADE, 1979), although age-specific economic activity rates of women in rural areas were higher in 1970 than in 1953. At the national level in 1970, two-thirds of all women resided in urban areas, which contained approximately four-fifths of the economically active female population.

Because of persistent labor shortages and a policy of expanding the labor force to increase aggregate economic growth, more concerted efforts were made in the late 1960s to raise the levels of female labor force participation. Between 1969 and 1972, in anticipation of the big sugar production push, a goal of incorporating 100,000 women a year into the full-time labor force was established. However, there was also a high attrition rate, with two out of three women who entered the labor force withdrawing soon thereafter. Social surveys conducted in the early 1970s identified the underlying causes of this high attrition rate. These included inflexible work schedules (usually only full-time employment for 5 and 1/2 days per week is available); discrimination in promotion; limited child care facilities; a shortage of services that facilitate employment, such as home appliances, laundries, and prepared foods; elimination of domestic service as an occupation; and husbands' attitudes that created the double burden of employment and domestic tasks for employed women (Departamento de Orientacion Revolucionaria, 1976).

As a result of the attrition rate, to achieve an increment of approximately 197,000 female workers in the period 1969-74, it was reportedly necessary to incorporate 714,000 women (Departamento de Orientacion Revolucionaria, 1976). To support these efforts, the State provided widespread access to contraception and abortion, as well as legal statutes ensuring equal pay scales and maternity leave. Free compulsory primary and secondary education for children, boarding schools, and scholarships also shifted some child care tasks from parents to the state. During the early to mid-1970s, there were also reversals in some policies related to promotions for women, preferential access to goods and services for employed women, and provision of day care (Hollerbach, 1980b). For instance, between 1972 and 1979, the number and capacity of child care centers was increased by 27 and 89 percent, respectively (see Table 51); child care, though formerly provided for free, was made available on a sliding-scale basis in 1977. Thus, the child care needs of the country are apparently being fulfilled, especially considering that rapid fertility decline will reduce the number of children likely to need these facilities in the future.

Current rates of female employment contrast with the attrition patterns of the early 1970s. Since 1969, the proportion of women in the labor force has increased from 22.9 percent to 28 percent in 1975 and 29 percent in 1979, although the annual definition of the labor force

TABLE 50 Percent of Women Economically Active, Employed, and in the Potential Labor Force, by Age and Marital Status, 1970, 1979: Cuba

Age Group	Economically Active, by Marital Status				All Marital Statuses		
	All Marital Statuses		Married and in Consensual Union, 1979	Single, Separated, Divorced, and Widowed, 1979	Economically Inactive in the Potential Female Labor Force, 1979	Currently Employed in the Labor Force	
	1970	1979				1970	1979
14	1.4	5.2				1.4	3.7
(14-19)		(15.1)	(3.5)	(11.6)	(5.7)		
15-19	16.4	17.5			10.8	15.9	11.6
20-24	25.3	46.8	22.9	23.9	10.7	24.7	40.3
25-29	24.2	51.5	34.8	16.7	10.9	23.9	45.4
30-34	23.0	50.8	37.1	13.7	9.7	22.8	46.1
35-39	22.1	50.1	37.6	12.5	8.8	22.0	45.3
40-44	21.1	45.5	33.3	12.2	6.3	21.0	41.6
45-49	18.9	35.8	--	--	--	18.8	33.1
50-54	15.9	28.5	--	--	--	15.9	26.7
55-59	12.0	15.3	--	--	--	12.0	14.7
60+	3.6	4.8	--	--	--	3.6	4.5

Total	17.8	31.9	39.0	36.6	8.7	17.6	28.1

Note: The economically active population was defined in the 1979 National Demographic Survey as the population age 14 and above of both sexes currently working, those temporarily unemployed currently seeking work, and those seeking employment for the first time. The concept labor force refers to the population employed in the week preceding the survey. The economically inactive were asked if they would be seeking work within the next 6 months. Those indicating they would were classified as future entrants in the potential labor force.

Source: 1970 data and 1979 data on economic activity and labor force for all marital statuses: Comite Estatal de Estadisticas (1981d:Table 5). 1979 data on the potential labor force and 1979 data by marital status: Comite Estatal de Estadisticas (1981b:Tables 13 and 18).

TABLE 51 Trends in Availability and Use of Child Care Facilities, 1972-79: Cuba

Year	Number of Child Care Centers	Year-End Capacity	Number of Mothers Using Child Care Centers	Average Number of Children Enrolled	Average Number of Children Attending[a]
1972	633	42,516	40,837	45,967	31,870
1973	642	42,172	45,136	51,807	34,630
1974	654	43,581	50,043	54,570	36,633
1975	658	47,147	54,179	59,856	40,361
1976	674	50,463	60,119	64,086	42,312
1977	713	57,788	58,007	65,598	44,957
1978	766	70,639	77,333	72,730	47,267
1979	802	80,509	83,439	88,430	55,398

[a] Defined as the sum of daily attendance figures divided by the number of working days.

Source: JUCEPLAN, C.E.E. (1980:Table 1).

has shifted to include or exclude various ministries or military personnel (see Table 46). Estimates provided by Mesa-Lago (1981) show somewhat lower rates (24 percent in 1978).

Table 47 provides data on the female employed population by economic sector in 1979, based on estimates derived from the 1979 National Demographic Survey. These data show only minor changes from the 1970 distribution of the female labor force. Women's participation in social service occupations (roughly defined as services, education, public health, and other unproductive activities), had increased to one-half of those employed; approximately 18 percent were employed in industry, 13 percent in commerce, and only 12 percent in agriculture and mining. The last two columns of Table 47 demonstrate the employment distribution by sex. Not surprisingly, male workers dominate industry, construction, agriculture and mining, and transportation and communication; women are concentrated in education, culture and art, public health, social security, sports and tourism, and commerce.

Table 48 provides an alternative perspective on female employment, by occupational status. The data show that in 1979, half of the women (in comparison to 19 percent of male workers) were in professional and technical, managerial, and administrative positions. More than one-fourth were involved in service activities, 14 percent were nonagricultural laborers, and 8 percent were agricultural laborers.

Data from the 1979 National Demographic Survey show that 31.9 percent of women aged 14 and above were economically active during the week prior to the survey: 28.1 percent were currently employed, while the remainder were temporarily unemployed and actively seeking employment, or currently seeking employment for the first time. Among women of reproductive age (14-49), 39 percent were economically active; an additional 8.7 percent were classified as in the "potential labor force," that is, expecting to enter the labor force within the next 6 months (Comite Estatal de Estadisticas, 1981b). Although female economic participation in Latin America is frequently underestimated, especially with regard to the enumeration of unpaid family workers, the economic activity rate for Cuba appears to be one of the highest for Latin America, except for Uruguay, but is lower than those for other Caribbean and Central American nations, such as Jamaica, Panama, and Haiti (Safilios-Rothschild, forthcoming). It is lower than the rates estimated for most of the developed Western economies, and much lower (nearly half) than the levels in Eastern European countries with centrally planned economies (International Labour Office, 1977).

Age- and marital-status-specific female economic activity rates for women of childbearing age are shown in Table 50. The overall rates for 1979 are generally above 50 percent for women aged 25-39 and lower at other ages; the rates are considerably lower for women below age 19. Although this is consistent with the pattern of early childbearing in Cuba and the high rates of enrollment in secondary education, it is significant that participation rates below age 25 are also much lower than those found in other socialist countries or in developed Western economies (International Labour Office, 1977).

No data have ever been published on the number of live births or fertility desires of employed and nonemployed women in union. In the absence of any meaningful cross-tabulations on female employment and fertility, controlling for age, marital status, and education, it is impossible to assess the extent to which childbearing is an impediment to work outside the home or vice versa. However, some inferences can be drawn from the available data.

Table 52 illustrates the change in female economic participation among women aged 14 and above by marital

TABLE 52 Percent of Women Aged 14 and Above Economically Active and Inactive, by Marital Status, 1970, 1979: Cuba

	Economically Active Female Population			Economically Inactive Female Population[a]	
Marital Status	1970	1979	Percentage Change 1970-1979	Number	Percent
Single	21.8	25.0	14.7	556,431	24.5
Married	16.3	36.7	125.2	899,274	39.7
Consensual Union	9.2	24.8	170.0	462,181	20.4
Divorced	41.5	63.2	52.3	67,939	3.0
Separated	--	45.3	--	64,582	2.8
Widowed	7.7	9.1	18.2	217,059	9.6
Total[b]	16.9	31.6	87.0	2,267,466	100.0

[a] The economically inactive population includes persons temporarily out of work seeking employment, housewives, students, pensioners and recipients of economic assistance, and other similar situations.
[b] Data exclude women with unknown marital status.

Source: Comite Estatal de Estadisticas (1981d:Tables 6 and 9).

status. As the table indicates, the increase in female employment during the past decade has occurred primarily among married women and women in consensual union, rather than among single women. The proportion of married women employed increased from 16.3 percent in 1970 to 36.7 percent in 1979; among women in consensual union of lower education, an increase from 9.2 percent to 24.8 percent was reported. In contrast, relatively little change occurred in economic participation among single women aged 14 and above, 25 percent of whom were employed in 1979. Approximately 71.9 percent of single women, 55.8 percent of married women, 65.3 percent of women in consensual union, and 57.6 percent of women in other marital statuses were economically inactive and did not intend to enter the labor force at any time during the next 6 months.

Economic participation is also highest following the ages of peak childbearing. Table 50 provides data on the proportion of women in union and not in union who were economically active at the time of the 1979 survey, classified by five-year age groups. These data show that

33 to 38 percent of the women in union aged 25-44 were economically active; participation rates of women in union aged 20-24, and especially those aged 14-19, were much lower. As previously reported, age-specific fertility rates in 1979 ranged from 74.5 births per 1,000 women aged 15-19 to 131.8 births among those aged 20-24, and 80.2 among those aged 25-29. Thereafter, age-specific fertility drops sharply. The data therefore suggest that the majority of new entrants into the labor force began employment following childbearing, and that childbearing and employment still remain relatively incompatible as far as the time constraints involved.

Overall, it can be concluded that increased female education and employment levels, high rates of female participation in mass organizations, and statutory changes have all helped to alter women's traditional roles. In turn, these changes, usually associated with the process of modernization, should contribute to lower fertility through a rise in the female opportunity wage and an increase in the value of foregone female income. Provision of child care facilities on a sliding-scale basis should further encourage female employment by reducing the substitution costs of women's household services. Passage of the Family Code in 1975 and political discussion in mass organizations have also promoted a more egalitarian view of husband-wife relationships, including a sharing of domestic tasks and child-rearing responsibilities. According to some of the provisions of the Code, these tasks are to be shared equally by men and women; similarly, most legal distinctions by sex have been eliminated. Although the actual effect of these statutes on family relations cannot be assessed, in theory, they encourage employment through a reduction in child care constraints. Time-budget data reviewed below, however, still indicate a sharp division of labor on domestic tasks. Finally, policies aimed at maintaining full or nearly full male employment, age restrictions on employment, and compulsory education may also be involved in lower fertility since they have contributed to reducing the economic value of children to parents. However, the relatively low levels of female employment are incompatible with the extremely low fertility levels currently prevailing in Cuba.

It is likely that future incorporation of women into the labor force will slow in pace with the arrival at working age of the large baby boom cohorts. To illustrate, the number of persons aged 15-19 increased 42 percent from an estimated 800,000 persons of both sexes in 1975 to some 1,136,000 in 1980, a dramatic increase following a period of gradual growth. Between 1980 and 1990, the age group 20-29 is projected to increase by more than 700,000 persons, in comparison to the increase of 142,000 between 1970 and 1980 (Comite Estatal de Estadisticas and CELADE, 1980b). Efforts to increase labor productivity and improve economic performance through use of capital-intensive measures, especially in the agricultural sector, should also serve to slow the increase in female employment. The 1981-85 plan reportedly "set as a goal the maintenance of the current proportion of female participation in the labor force" (Mesa-Lago, 1981:20).

Time Constraints

Cubans, particularly working women, face a number of constraints on the time available for childbearing and rearing. These include employment, the performance of domestic tasks, transportation time, leisure, and social and political participation (in mass organizations, volunteer work, guard duty, and meetings and assemblies).

Table 53 illustrates the results of a time use study conducted in April 1975 among 251 employed and 339 non-employed women residing in five Cuban cities (Santiago de Cuba, Camaguey, Matanzas, La Habana, and Nueva Gerona). Respondents were asked to record the approximate number of hours spent on a variety of activities on the day prior to the interview. Unfortunately, data were not collected on the women's fertility (Garcia, 1978). Employed women spent considerably less time during the week on domestic activities (including childrearing), physiological activities, and leisure; as might be expected, they spent more time in transportation, but only a bit more time in political and social activities. The amount of time spent by employed women in domestic activities increased on the weekends (from 3:42 hours to 7:54 hours), but was still less than that recorded for nonemployed women (8:36 hours). Leisure time increased for both groups of women on the weekends. However, for nonemployed women, the increased leisure time was due directly to reduced time spent in domestic and physiological activities; for employed women, increased leisure time resulted from a reduction in work hours.

TABLE 53 Time Budgets for Employed and Nonemployed Women on Weekdays and Weekends, Five Cities, 1975: Cuba

	Average Time Spent (in hours and minutes)			
	Weekday		Weekend	
Activity[a]	Employed Women[b]	Nonemployed Women	Employed Women[b]	Nonemployed Women
Work	8:06	--	--	--
Transportation	1:12	0:30	0:48	0:48
Domestic Tasks	3:42	9:18	7:54	8:36
Psychological Activities	8:42	10:00	9:54	9:36
Political and Social Activities	0:30	0:18	0:24	0:06
Leisure Time	1:36	3:54	5:00	4:36
Unregistered Time	0:12	--	--	0:18
Total	24:00	24:00	24:00	24:00

[a] The activities covered include work, transportation (including commuting), domestic tasks (e.g., cooking, washing, shopping, sewing, ironing, child care, and use of public services, physiological activities (sleeping, eating, personal cleanliness), social and political activities (CDR work, volunteer labor, guard duty, and meetings and assemblies), and leisure time activities (all other time).

[b] Weekday time budgets for employed women pertain to an actual work day; weekend data for these women pertain to a nonwork day. Part of the sample was interviewed with regard to weekday activities and the other half with regard to weekend activities.

Source: Garcia (1978:44-47).

Another time budget study conducted in September 1975, in the five provincial capitals of Pinar del Rio, Matanzas, Santa Clara, Camaguey, and Santiago de Cuba was designed to assess differentials in time use between males and females (Hernandez, 1978). For this study, 1,180 interviews were conducted with 473 employed males, 262 employed females, and 445 nonemployed females aged 16 to 65. The methodology used required self-registration of time on the day following the interview. Table 54, which averages time use from Monday to Sunday, shows differentials between employed and nonemployed women similar to those previously mentioned. Employed women spent less time during the week on domestic, physiological, and leisure activities. Comparisons between men and

TABLE 54 Time Budgets for Employed Men and Women and Nonemployed Women on an Average Day (Monday-Sunday), Five Provincial Capitals, 1975: Cuba

Activity[a]	Average Time Spent (in hours and minutes)[b] Employed Men	Employed Women	Nonemployed Women
Work	6:56	5:32	---
Transportation	1:52	1:22	0:26
Domestic Tasks	0:38	4:44	9:14
Physiological Activities	9:20	8:56	9:42
Political and Social Activities	0:32	0:20	0:19
Leisure Time	4:40	2:59	4:12
Unregistered Time	0:20	0:07	0:07
Total	24:00	24:00	24:00

[a] The activities covered include work, transportation (including commuting), domestic tasks (e.g., cooking, washing, shopping, sewing, ironing, child care, and use of public services), physiological activities (sleeping, eating, personal cleanliness), social and political activities (CDR work, volunteer labor, guard duty, meetings, assemblies), and leisure time activities (all other time).

[b] Each day of the week was covered through proportional distribution.

Source: Hernandez (1978:91).

employed women, on the other hand, show that men spent considerably less time on domestic activities, more on physiological and leisure activities: the amount of daily time recorded for domestic activities per day was approximately 40 minutes for employed men and 4 3/4 hours for employed women (Hernandez, 1978). Time use studies conducted in 1979 demonstrate many of the same trends. The only exception is the amount of time spent on physiological activities, which was roughly similar for all three groups (Instituto Cubano de Investigaciones y Orientacion de la Demanda Interna, 1980).

In conclusion, employed women spend considerably less time on domestic tasks and record less leisure time than do nonemployed women. Whether this is due in part to lower fertility among employed women cannot be ascertained from the data. However, employed women spend considerably more time on domestic tasks and have less leisure time than do employed men, indicating that the burdens imposed by domestic tasks are not equally shared. Time constraints due to political and social activities are relatively limited and do not differ greatly between employed men and women and nonemployed women.

SOCIAL POLICIES AND PATTERNS

Education

Increased levels of education appear to be important determinants of the fertility decline in Cuba. Illiteracy rates have declined, adult educational levels have been raised, and educational opportunities have been expanded, particularly in rural areas.

In 1970, the Cuban illiteracy rate stood at 13 percent among the population aged 10 and above, or about half the rate recorded in 1953 (24 percent), the year of the previous census. During the intercensal period, urban illiteracy rates were reduced from 12 to 7 percent and rural rates from 42 to 22 percent. As noted in Table 55, rates of illiteracy among those aged 10-49 had reached 4 percent by 1979 (2.3 percent in urban areas and 7.1 percent in rural areas). Although these figures exclude the older population above age 50, they illustrate the decline in illiteracy by age group, especially sharp in rural areas. This recent evidence suggests that the illiteracy rate in Cuba may be comparable to rates recorded in other Latin American countries with well-developed educational systems, such as Costa Rica and Panama, where the estimated rate is below 10 percent.

As noted in Table 56, based on the 1979 National Demographic Survey, 15.5 percent of the women aged 15-49 had 3 years or less of primary education. These levels may be marginal, especially in rural areas, where 26 percent of the women had achieved only this level of education, as compared to 11 percent of the urban women. However, 47 percent had had at least some secondary education (intermediate and university). In comparison, in Costa Rica, Jamaica, and Panama, the proportions of women who have completed at least 1 year of secondary education or higher comprise only 26, 23, and 33 percent, respectively, of the population of ever-married women aged 20-49 (Diaz-Briquets and Perez, 1982).

TABLE 55 Rates of Illiteracy in the Population Aged 10-49, by Sex and Rural-Urban Residence, 1979: Cuba

Age Group	Urban Areas			Rural Areas			Areas Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
10-14	1.1	0.8	1.1	2.2	1.7	2.0	1.7	1.2	1.4
15-19	1.1	0.7	1.1	2.3	1.6	2.0	1.7	1.0	1.4
20-24	1.1	0.9	1.1	3.4	2.8	3.1	2.1	1.6	1.8
25-29	1.6	1.6	1.6	5.1	4.2	4.7	2.8	2.4	2.6
30-34	2.1	2.5	2.1	7.7	9.6	8.6	3.7	4.7	4.2
35-39	3.5	4.3	3.5	11.7	17.1	14.3	5.7	8.2	6.9
40-44	4.3	5.4	4.3	16.2	21.7	18.8	7.5	10.3	8.9
45-49	6.8	7.3	6.8	22.0	26.9	24.3	11.7	13.1	12.4
Total	2.3	2.5	2.3	6.6	7.6	7.1	3.7	4.2	4.0

Source: Comite Estatal de Estadisticas (1981c:Table 21).

TABLE 56 Female Population Aged 15-49 by Educational Attainment and Rural-Urban Residence, 1979: Cuba

	Total		Urban		Rural	
Education	Number (in 1,000s)	Percent	Number (in 1,000s)	Percent	Number (in 1,000s)	Percent
Primary[a]	1251.7	53.3	694.7	43.9	557.0	72.6
0-3	363.9	15.5	168.0	10.6	195.9	25.5
4-5	361.4	15.4	191.3	12.1	170.1	22.2
6	526.4	22.4	335.4	21.2	191.0	24.9
Intermediate 1+ years	1020.1	43.4	813.5	51.5	206.6	26.9
University 1+ years	77.0	3.3	72.9	4.6	4.1	0.5
Total	2348.8	100.0	1581.1	100.0	767.7	100.0

[a] Primary education has been divided into 0-3 years, 4-5 years, and 6 years (primary school completed). Intermediate education lasts 6 years and includes basic secondary and preuniversity, technical and professional, and teacher preparation, sometimes referred to as "normal school."

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 11).

The expansion of post-primary education and the reduction of class and sex barriers to education were promoted during the 1960s through the abolishment of private schools, the incorporation of rural students into urban schools, and the provision of government scholarship aid. The latter, initiated in 1962-63, provides education, food, dress, and lodging to students, although school uniforms are now excluded. In 1979-80, 3 percent of all primary school students, 38 percent of all basic secondary school students, 61 percent of all preuniversity students, and 41 percent of all technical and professional students were receiving scholarships. The total number of scholarships provided was 580,052, the majority of which were directed to middle-level education.[33]

The number of schools and teachers at all levels of education has greatly increased, as have the number of students enrolled and graduated. By 1976, for example, an impressive 99 percent of children aged 6-12 attended primary school. Although children are expected to remain in school until age 16, attendance of children aged 13-16 is lower (78.3 percent of the school-age population in

1975-76) (Hernandez Castellon, 1977). At age 17, males are required by law to seek employment until age 60, unless physically incapacitated. School drop-out rates are reportedly higher for women in rural areas and are probably related to an earlier age at union.

Table 57 summarizes overall educational statistics for selected years between 1960 and 1980. Some discrepancies in enrollment figures exist in published data, as noted in the table, and these statistics should therefore be interpreted cautiously. In part, the increase in enrollment reflects demographic growth associated with the baby boom, as suggested by the figures on enrollment in primary school for 1974-75 and 1979-80. As the baby boom children have aged, the number of students in primary school has declined, and enrollments have increased substantially at higher levels. From 1960-61 to 1979-80, university enrollment increased from 19,454 students (both private and public) to 146,240, in part because of the expansion of primary and intermediate-level education. Younger cohorts have attained higher education levels than older ones since the former have benefited by the recent expansion of education services.

At the university level, reforms have created an educational system more attuned to national needs. Students have been channeled into priority areas such as education, economics, engineering, agriculture, and health sciences. At all levels, education has been made equally accessible to men and women, although ideological and political criteria play a role in determining admission to universities and technical institutions. Only a small proportion of women had received at least some university education in 1979--approximately 3 percent of the women aged 15-49, according to the National Demographic Survey. However, among matriculated students in 1978-79, women constituted 48 to 54 percent at all but the university level, where they constituted 40 percent.

The government has also raised the cultural and educational level of its adult population through a variety of innovative programs begun in 1962, designed to encourage the adult population to attain a sixth-grade education by 1980 and to qualify women for employment. Adult education includes "worker-peasant" education for the recently literate up to sixth grade, secondary courses, language training, and "worker-peasant" pre-university classes. In addition, special courses in both adult education and training have been provided. Adult education programs have been extremely successful. From

1962-63 through 1974-75, 662,023 adults reportedly completed the sixth grade. In 1974-75, 411,980 persons were enrolled in adult education programs; by 1979-80, this figure had decreased to 391,990, suggesting that the need for these programs was declining. In 1979-80, 176,808 adults graduated from these schools.

The Cuban educational system still has a number of problems, including quality of instruction and a high student-teacher ratio (this should improve significantly in the 1980s at the primary school level, but worsen at the secondary level because of the aging of the baby boom cohorts); irregular educational materials; and poor building maintenance (Dominguez, 1978). By 1979, as Table 56 shows, the government goal of 6 years of primary education as a national norm was far from having been attained: 31 percent of the women of reproductive age had not completed primary school. In rural areas, nearly half of all women of childbearing age had completed less than 5 years of primary education. Over half of all women, especially those in urban areas, had reached but not necessarily completed intermediate education; only about one-quarter of rural women had done so.

Educational improvements of the magnitude described above have undoubtedly been important factors in Cuba's fertility decline. A perspective on the extent to which educational attainment and fertility are associated is provided in Tables 58, 59, and 60. As these tables show, age-specific and total fertility rates are much lower among the better-educated than among the least-educated. For instance, in 1965 the total fertility rate of women with 0-3 years of education was 6.3 children, as compared to 2.0 among those with at least 1 year of university education. From 1965 to 1977, the sharpest reductions in fertility occurred among women with less than a primary school education, especially among those with less than 3 years of schooling completed, whose fertility began to decline after 1967. The smallest changes occurred among the better-educated women. Among these women, fertility increased somewhat during the early 1970s and then continued to decline (see Figure 18). After 1972, fertility declined more sharply among these women. By 1977, those with lower intermediate, upper intermediate, and university educations had achieved below-replacement-level fertility (TFRs of 2.0, 1.6, and 1.5, respectively).

Table 59 illustrates the decline in fertility within different educational and age groups from 1964-66 to 1976-78. During the period in question, declines in

TABLE 57 Educational Data, Selected Years, 1960-61 to 1979-80: Cuba

Year	Educational Level Primary	Basic Secondary	Preuniversity	Technical and Professional[a]	Teacher Preparation[b]	University[c]	Adult Education[d]
Teaching Personnel							
1960/1961	29,924[e]	4,055	1,169	1,300	--	1,845[f]	--
1970/1971	60,592	14,334	939	4,692	1,910*	4,415	--
1974/1975	78,451	24,541	1,963	6,173	3,353*	5,847	26,501
1979/1980	77,063	50,815	9,738	15,018	6,078	10,736	29,201
Matriculated Students[g]							
1960/1961	1,136,277	71,057	18,697	25,632	--	19,454[f]	--
1970/1971	1,664,634	171,206	15,461	27,899	58,293*	35,137	--
1974/1975	1,801,191**	307,209	30,315	94,634*	88,137*	68,451	411,980**
1979/1980	1,550,323**	690,503	135,349	214,615	109,905	146,240	391,990
Scholarship Students[h]							
1960/1961	--	--	--	--	--	--	--
1970/1971	58,192	41,519	3,930	22,148	23,574*	18,229	79
1974/1975	46,089	122,559	13,533	60,112*	40,090**	21,566	--
1979/1980	50,769	259,217	82,987	99,901	35,613	41,478	--
Graduated Students[i]							
1960/1961	34,786	10,320	1,486	1,750	--	2,430	--
1970/1971	82,332	7,589	4,227	6,135	2,276*	3,624	--
1974/1975	190,611	27,210	7,810	16,257	10,624*	6,106*	133,505*
1979/1980	263,636	134,384	23,456	49,764	30,651	15,343	176,808

Notes: -- indicates data unavailable. Table includes all education data with the exception of juvenile education designed to elevate educational levels of 13 to 16-year-olds who have not been promoted and special education for students with physical, mental, emotional, or social anomalies.

* Data from previous issues of JUCEPLAN, C.E.E. show smaller totals.
** Data from previous issues of JUCEPLAN, C.E.E. show larger totals.

[a] Technical and professional school prepares students for a profession other than teaching (basic and university education); includes institutes of industry, agriculture, economics and administration, languages, and polytechnics.

[b] Teacher preparation includes all activities related to the formation of teaching personnel. Data for the 1970s include accelerated plans to train teachers in intensive courses, when upon completion they teach and continue studying until they reach the necessary grade level. Data on teacher preparation tend to fluctuate widely in different issues of the Anuario and should be considered highly tentative.

[c] University education is the level achieved upon completion of the minimum requirements of preuniversity training or demonstration of equivalent knowledge; includes faculties of technology, agricultural sciences, sciences, medical sciences, humanities, economics, and pedagogy.

[d] Adult education consists of classes organized for adults, and in some cases adolescents not subject to regular school obligations; includes worker-peasant education (recently literate to sixth grade), secondary course, language school, and worker-peasant faculty (preuniversity); second-semester data only.

[e] Excludes private sector.

[f] Includes private universities.

[g] Matriculated students are those enrolled in school at the beginning of the school year.

[h] Scholarship students receive food, dress, and lodging during the time they remain matriculated. Scholarship aid was initiated in 1962/1963.

[i] Students promoted to last grade or year.

Source: JUCEPLAN, C.E.E. (1976:Tables 7-15; 1979:Tables 7-17).

TABLE 58 Total Fertility Rates, by Educational Attainment, 1965-77: Cuba

	Births per 1,000 Women, 15-49												
Education	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Primary													
0-3 years	6.3	6.4	6.3	6.2	5.9	5.7	5.6	5.4	5.2	4.7	4.3	3.8	3.2
4-5	5.2	5.1	4.9	4.8	4.6	4.6	4.7	4.7	4.4	4.1	3.9	3.8	3.4
6	4.2	4.0	3.8	3.7	3.6	3.6	3.7	3.6	3.4	3.1	3.0	2.8	2.6
Lower Intermediate[a]	3.2	3.1	2.9	2.9	2.9	3.1	3.0	2.9	2.6	2.4	2.3	2.2	2.0
Upper Intermediate	2.7	2.5	2.5	2.5	2.6	2.4	2.5	2.3	2.2	1.8	1.7	1.6	1.6
University 1+ years	2.0	2.0	1.8	1.7	1.6	1.6	1.7	1.8	1.6	1.5	1.4	1.4	1.5

[a] Intermediate schooling of 6 years includes basic secondary, preuniversity, technical and professional school, and normal school for teacher training.

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 12).

TABLE 59 Age-Specific Fertility Rates for Five-Year Age Groups, by Educational Attainment, 1964-66 and 1976-78: Cuba

	Age Group						
Education	15-19	20-24	25-29	30-34	35-39	40-44	45-49
0-3 Primary							
1964-66	217	314	276	224	156	67	16
1976-78	178	204	116	78	47	20	5
4-5 Primary							
1964-66	180	276	241	177	107	48	6
1976-78	--	206	120	68	36	16	2
6 Primary							
1964-66	136	232	199	141	84	36	7
1976-78	--	167	90	51	23	8	2
Lower Intermediate							
1964-66	84	191	163	108	61	29	6
1976-78	78	139	90	49	27	5	3
Upper Intermediate							
1964-66	53	143	158	122	42	18	3
1976-78	27	113	84	48	33	10	2

Note: -- indicates inadequate data for estimation (as in Table 60) of TFR.

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 13).

fertility were especially marked among women aged 25 and above, regardless of educational level, but especially among those with less than a primary school education. By the end of the 1970s, age-specific fertility rates did not differ greatly among women who had at least completed primary school. The smallest declines occurred among those under age 25, except for those 15-19 with the highest levels of educational attainment. Age-specific fertility rates are still higher among women aged 15-19 and 20-24 with less than a primary school education. However, over time, the largest percentage decline in the total fertility rate was recorded among the least-educated women and the smallest among the most educated (Figure 19).

TABLE 60 Total Fertility Rates, by Former Provincial Division and Educational Attainment, 1964-66 and 1976-78: Cuba

	Pinar del Rio		La Habana		Matanzas		Las Villas		Camaguey		Oriente	
Education	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78	1964-66	1976-78
Primary												
0-3	6.1	3.4	5.3	2.2	5.6	2.3	5.7	2.6	5.8	3.4	6.9	3.8
4-5	4.7	3.6	5.1	3.1	4.4	2.9	4.9	3.1	4.5	3.5	5.6	3.6
6	4.3	2.6	4.0	2.3	4.2	2.0	4.0	2.2	4.3	2.9	4.6	2.8
Intermediate 1+ years	3.2	1.7	2.8	1.8	3.0	1.8	2.7	1.8	3.6	1.9	3.5	2.0
University 1+ years	--	--	1.8	1.5	1.5	1.1	1.6	1.4	--	--	--	1.3

Note: -- indicates inadequate data for estimation of TFR.

Source: Comite Estatal de Estadisticas and CELADE (1981:Table 14).

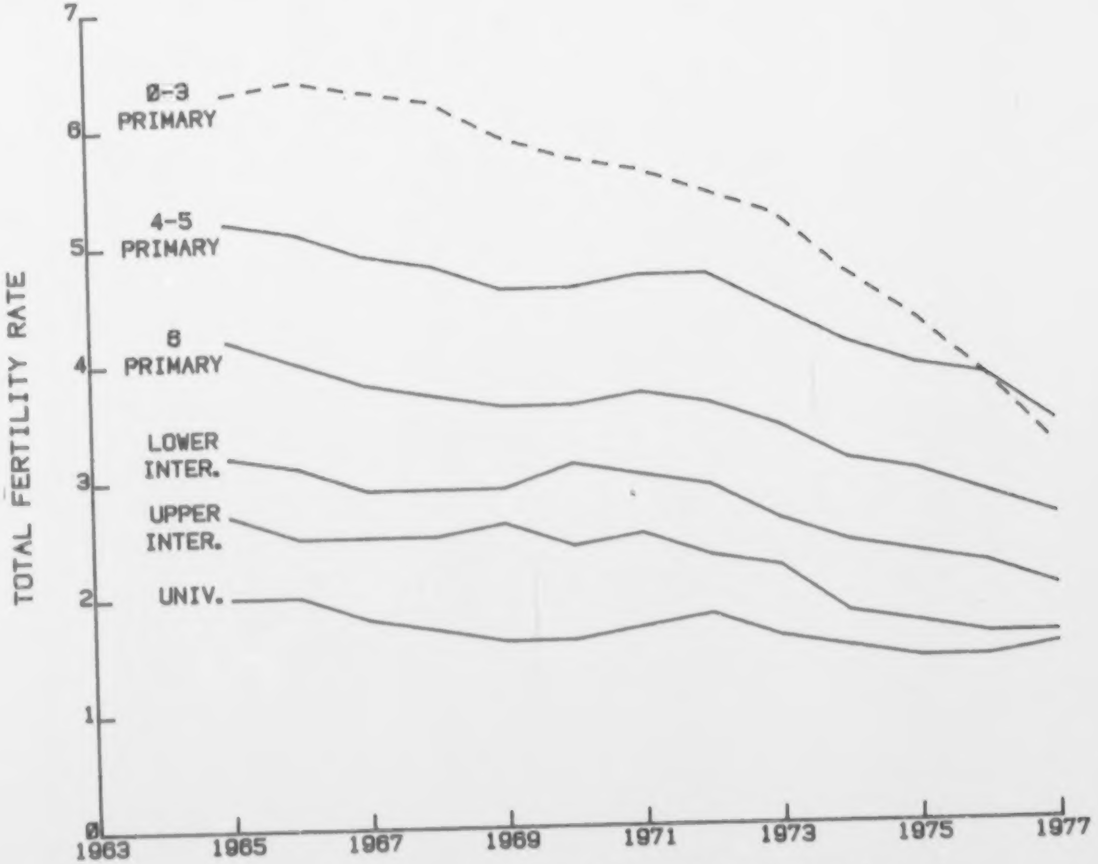


FIGURE 18 Total Fertility Rates, by Educational Attainment, 1965-77: Cuba

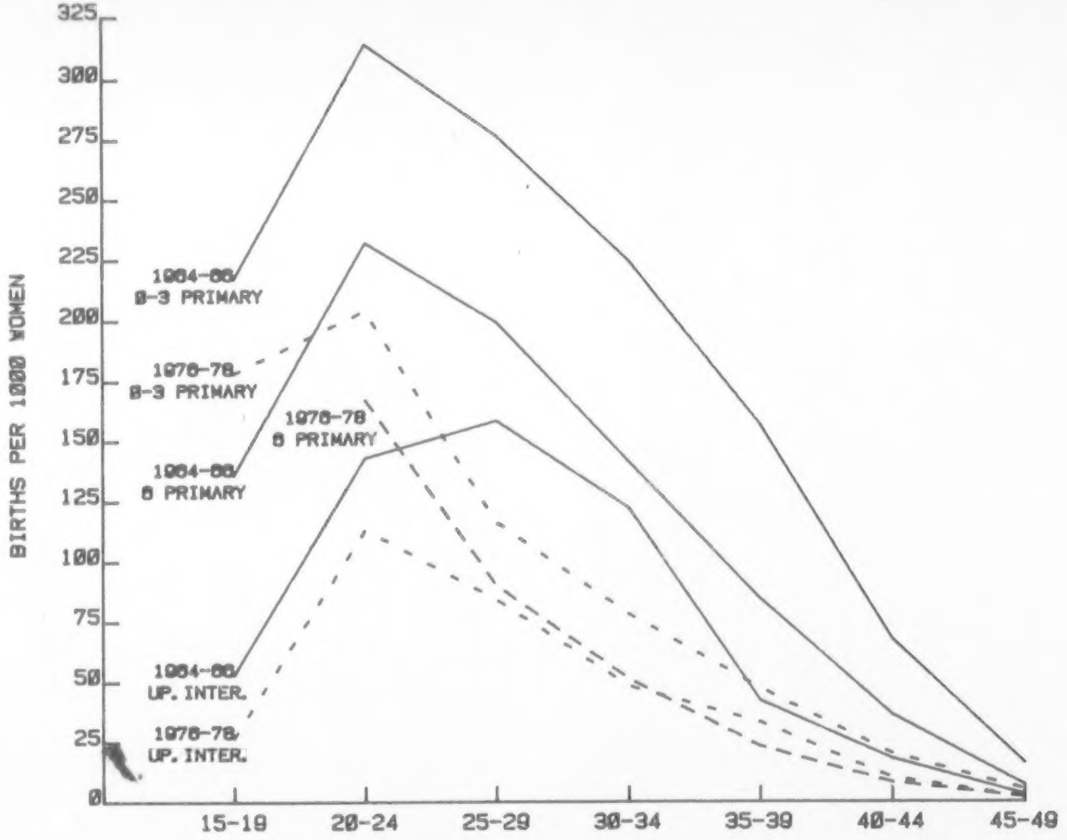


FIGURE 19 Age-Specific Fertility Rates for Five-Year Age Groups, by Educational Attainment, 1964-66 and 1976-78: Cuba

Table 60 shows differentials in total fertility rates by education and provincial division. At the tail-end of the baby boom, fertility among women with 0-3 years of education was high in all provinces, but especially in the rural provinces of Pinar del Rio and Oriente where TFRs of 6.1 and 6.9, respectively, were recorded. By the end of the 1970s, however, fertility had declined in all provinces within all educational categories; women with at least some intermediate education had reached replacement-level fertility. Fertility still remained somewhat higher in Pinar del Rio, Oriente, and Camaguey among women with less than intermediate levels of education (Comite Estatal de Estadisticas and CELADE, 1981).

The role of educational improvements in the fertility decline is difficult to judge. The direct relationship has recently been estimated by consideration of what the overall fertility level in 1978 would have been had the total fertility rates by educational group in 1964-66 been applied to the educational structure recorded in 1978 (Comite Estatal de Estadisticas and CELADE, 1981). By comparing the hypothetical total fertility rate thus derived against the actual rate, it was possible to estimate the "independent" effect of education on fertility. These calculations suggest that roughly 20 percent of the total fertility decline can be directly attributed to educational changes.

Of course, this estimate does not take into account other potential mechanisms through which improvements in educational attainment could have influenced fertility. It should also be noted that the calculations on which the estimate is based tend to overestimate the independent impact of educational changes on the course of fertility decline; this is because the years 1964-66 constitute a historical anomaly, corresponding to the tail-end of the baby boom of the 1960s. As noted earlier, the birth rate had risen from about 26 in 1958 to 35 in 1963-64, or by 35 percent. Thus, the "direct" contribution of increased educational attainment to fertility decline is less than the estimated 20 percent, although an exact calculation cannot be made without data on total fertility rates by educational attainment for the period immediately preceding the revolution.

Delivery of Health Services

Today Cuba has one of the most advanced health care systems in the developing world. The coverage of the system, emphasizing preventive, primary health care, is nearly universal in both urban and rural areas. In 1961, all major private hospitals were nationalized; by 1963, all health care had become state-administered, and medical services were provided free. Medicines, although sometimes in short supply because of the hemispheric embargo and the necessity of importation from socialist countries, are provided free or sold at highly subsidized prices within national pharmacies.

During the last decade, Cuba has done exceptionally well in improving health conditions. In the last two decades, the allocation of national resources to the health sector has been disproportionate in relation to the country's total resources in view of its economic difficulties. This investment of resources began to pay off in the early 1970s, when the service levels of the late 1950s were finally surpassed. In the interim, new health facilities and personnel have been concentrated in rural areas, resulting in a notable change in regional distribution and hence equalization of medical facilities.

Health care services are organized into three levels: primary, secondary, and tertiary. The primary range of services is concentrated at the local level through the polyclinic, an ambulatory out-patient facility, and its affiliated organizations, such as rural hospitals, medical posts, and maternity homes (Rojas Ochoa, 1976). Each municipality (169 in total) has a defined number of health areas (332 in total)--a geographical district with 20,000 to 30,000 people. These areas are served by an urban polyclinic or rural hospital. In turn, each health area is subdivided into health sectors; the staff of each polyclinic is divided into primary horizontal teams composed of one of the primary care specialists (internist, pediatrician, or obstetrician-gynecologist), a corresponding nurse, and an assigned panel of patients. Thus, a pediatrician-nurse is responsible for the health promotion and maintenance of 2,000 to 3,000 children in a specific geographical area served by the polyclinic; internists are responsible for 3,000 to 5,000 adults; and every obstetrician-gynecologist is responsible for 3,000 to 4,000 women above age 15 (Rojas Ochoa, 1976). By 1981, this health service delivery system, termed "medicine in the community," had been extended to more than 90 percent of the polyclinics in the country. In 1980, the average number of polyclinic consultations was an exceedingly high 12.7 per infant, 3.6 per child aged 1-4, and 1.6 per child aged 5-14 (Ministerio de Salud Publica de Cuba, 1981). Rural hospitals and health facilities are staffed by newly graduated physicians, who must serve a mandatory period of 2 years of rural service, with the backup of more experienced physicians; these newly graduated physicians are assigned to different areas according to need. The secondary-level services provide personnel and services for hospitalizations, less-specialized referrals, and backup consultations. Included are general obstetrical-gynecological, pediatric, and maternal-infant hospitals. Finally, at the tertiary level, are hospitals and medical centers offering the most specialized in-patient care, as well as teaching and research activities. As of 1981, there were 386 polyclinics in Cuba (approximately one per 20,000 to 30,000 population), 151 rural medical posts, and 18 other posts; in addition, there were 256 hospitals (90 general, 78 maternity-infant, 35 other, and 53 rural hospitals), and a teaching polyclinic for each province (Ministerio de Salud Publica de Cuba, 1981).

The growth in facilities has been matched by the resources devoted to training physicians and health personnel. Large numbers of physicians have graduated, especially since 1973, to augment and surpass the supply of trained physicians who emigrated during the 1960s. The number and quality of physicians declined in the early 1960s, with the lowest point reached between 1962 and 1964 (probably one physician per 1,200 to 1,500 inhabitants). By the mid-1970s, the number of physicians completing their training per year was three to four times what it had been in the early and mid-1960s. Between 1959 and 1980, over 15,000 physicians were graduated. The prerevolutionary ratio of physicians to 1,000 population was recouped in 1976; by 1980, Cuba had achieved an exceedingly favorable ratio of one physician for every 707 inhabitants, compared to the 1959 ratio of one per 1,000. By 1980, there was one newly trained pediatrician for every 254 births and one newly trained obstetrician-gynecologist per 4,556 women aged 15-44.[34]

The Decline in Infant Mortality

The contribution of the national health system to the well-being of Cuba's population is reflected in the very favorable indicators of mortality summarized in Table 61. Life expectancy at birth for both sexes combined, which by 1970 had reached 70 years, is estimated to have

TABLE 61 Life Expectancies and Infant Mortality Rates, 1958-80: Cuba

	Life Expectancy			
Year	Female	Male	Both Sexes	Infant Mortality Rate[a]
1958				33.4
1959				34.7
1960[b]	66.0	62.0	64.0	37.3
1961				39.0
1962				41.7
1963				38.1
1964				37.8
1965[b]	68.9	65.4	67.2	37.8
1966				37.2
1967				36.4
1968				38.2
1969				46.7
1970[b]	71.5	68.4	70.0	38.7
1971				36.5
1972				28.7
1973				29.6
1974				29.3
1975				27.5
1976				23.3
1977				25.0
1978				22.3
1979				19.4
1980[c]	74.4*	71.2*	72.8*	19.6[d]

*Projected

Sources:

[a] Infant mortality rates 1958-79: Comite Estatal de Estadisticas and CELADE (1980a:Table 2).

[b] Life expectancies in 1960, 1965, and 1970: Farnos Morejon (1976:Table 7).

[c] Life expectancies in 1980: Comite Estatal de Estadisticas and CELADE (1980a:Table 18).

[d] Infant mortality rate 1980: Ministerio de Salud Publica de Cuba (1981:Table 8).

increased to 72.8 years by 1980 (Comite Estatal de Estadisticas and CELADE, 1980a). This life expectancy is similar to those estimated for Jamaica and Panama (70) and Costa Rica (71.2).

This higher life expectancy is attributable, in part, to the eradication of malaria and poliomyelitis and, to a greater extent, to a sharp reduction in mortality from typhoid fever, diphtheria, tetanus, tuberculosis, acute diarrheal disease, and infectious and parasitic disease. In 1980, the five principal causes of death for all ages combined were cerebrovascular diseases, arterial diseases, malignant tumors, influenza and pneumonia, and accidents (see Table 62). This is the pattern typically found in low-mortality countries.

These gains in life expectancy are associated with considerable declines in infant mortality. By 1981, Cuba's officially reported infant mortality rate stood at 18.5 per 1,000 live births. Although an independent evaluation conducted for this study, based on the 1979 National Demographic Survey, indicates considerably higher infant mortality for the late 1970s than the official figures, the latter are accepted for two reasons. First, there is statistical consistency in the previous mortality estimates, and second, there is no evidence that the official registration system has sharply deteriorated. Therefore, it appears that the survey data are probably distorted and that the official figures should be accepted as broadly accurate. This substantial decline in overall infant mortality is attributable first to a decline in mortality from acute diarrheal disease and infectious and parasitic disease. Between 1966 and 1980, the mortality rate from acute diarrheal disease declined from 20.2 deaths per 100,000 inhabitants to 3.1 deaths; infectious and parasitic disease mortality rates declined from 48.1 deaths per 100,000 inhabitants to 10.1 deaths. The decline in infant mortality is also attributable to the national plan for maternal-infant care, which, as noted above, set goals for the reduction of infant and maternal mortality. As shown in Table 63 and Figure 20, from 1966 to 1980, infant mortality declined 47 percent from 37.3 deaths per 1,000 live births to 19.6 deaths and a provisional rate of 18.5 deaths in 1981. Maternal mortality declined 42 percent from 90.2 deaths per 100,000 live births in 1966 to 52.6 deaths in 1980 and a provisional rate of 40.4 deaths in 1981.

TABLE 62 Cause-Specific Death Rates[a], Selected Years, 1968-80: Cuba

Cause of Death	1968	1970	1972	1973	1974	1975[b]	1976[b]	1977[b]	1978[b]	1979[b]	1980[b]
Heart disease	149.1	148.6	135.4	144.6	155.8	148.3	159.0	162.7	168.9	165.4	167.9
Malignant tumors	96.6	98.9	100.8	99.2	98.8	99.3	104.0	104.4	99.2	102.3	106.8
Cerebrovascular diseases	66.2	60.3	53.0	51.5	52.1	50.8	51.9	57.1	53.6	53.5	54.6
Influenza and pneumonia	40.7	42.1	34.1	37.7	45.6	38.8	41.9	44.6	44.8	41.1	40.1
Accidents	31.9	36.1	31.8	31.7	31.4	33.3	33.5	39.5	38.6	38.0	37.7
Principal neonatal afflictions	41.6	41.7	36.9	32.6	28.7	25.2	20.0	17.9	14.7	14.0	13.3
Suicides and self-inflicted injuries	12.6	11.8	14.3	13.7	17.2	17.2	17.6	17.7	19.0	19.3	21.3
Diabetes	12.6	9.9	10.0	10.0	8.6	10.2	11.1	11.7	11.7	10.1	11.0
Congenital anomalies	15.4	14.1	14.1	13.3	12.5	12.0	10.9	10.0	8.5	8.4	7.9
Bronchitis, emphysema, and asthma	15.3	12.5	11.6	11.5	10.3	8.0	7.6	7.8	7.3	6.8	6.8

[a] Cause-specific death rates per 100,000 mid-year population, all ages.
[b] Provisional rates.

Sources: 1972-74 figures: Ministerio de Salud Publica de Cuba (1978:Table 7). 1968, 1970, 1975-78 figures: Ministerio de Salud Publica de Cuba (1979:Table 6). 1979-80 figures: Ministerio de Salud Publica de Cuba (1981:Table 6).

TABLE 63 Infant and Maternal Mortality Measures, 1966-80: Cuba

Year	Late Fetal Mortality Rate[a]	Mortality Rate (fetal deaths plus 0-7 days)	Early Neonatal Mortality (0-7 days)[b]	Late Neonatal Mortality (7-27 days)[b]	Postneonatal Mortality (28 days to 11 months)[b]	Infant Mortality (less than 1 year)[b]	Mortality (1-4 years)[c]	Maternal Mortality Rate[d]
1966	--	--	21.2	5.5	10.6	37.3	1.7	90.9
1967	--	--	15.4	5.8	15.2	36.4	1.8	90.1
1968	16.8	33.3	16.5	6.2	15.6	38.3	1.7	83.0
1969	15.8	32.7	16.9	8.7	21.1	46.7	1.8	85.0
1970	15.3	33.0	17.7	6.1	15.0	38.8	1.3	70.5
1971[e]	14.8	31.4	16.6	5.8	14.1	36.5	1.0	67.6
1972[e]	14.1	29.7	15.6	3.5	9.6	28.7	1.0	52.0
1973[e]	12.8	28.7	15.9	3.5	10.2	29.6	1.2	55.3
1974[e]	12.9	28.8	15.9	3.0	10.4	29.3	1.2	58.1
1975[e]	11.7	26.5	14.8	2.6	10.1	27.5	1.1	68.4
1976[e]	11.2	23.6	12.4	2.7	8.2	23.3	1.0	47.5
1977[e]	10.9	23.7	12.8	2.6	9.6	25.0	1.1	49.1
1978[e]	10.7	22.9	12.2	2.3	7.8	22.3	1.1	45.2
1979[e]	12.7	23.9	11.2	2.0	6.1	19.4	1.0	51.5
1980[e]	12.7	23.9	11.2	2.0	6.5	19.6	1.0	52.6
Percent Change	-24.4	-28.2	-47.2	-63.3	-38.7	-47.5	-41.2	-42.1

Note: -- indicates data not available.

[a] Fetal defined as 7 months and more of gestation according to fetal death certificates from 1968-72. Fetal defined as 1,000 grams and more for 1973-76. Rate per 1,000 live births.
[b] Per 1,000 live births.
[c] Per 1,000 population.
[d] Per 100,000 live births.
[e] Rates from 1971-80 are considered provisional.

Sources: 1966-67 figures: Ministerio de Salud Publica de Cuba (1978:Tables 4 and 6). 1968-80 figures: Ministerio de Salud Publica de Cuba (1980:Tables 6 and 9).

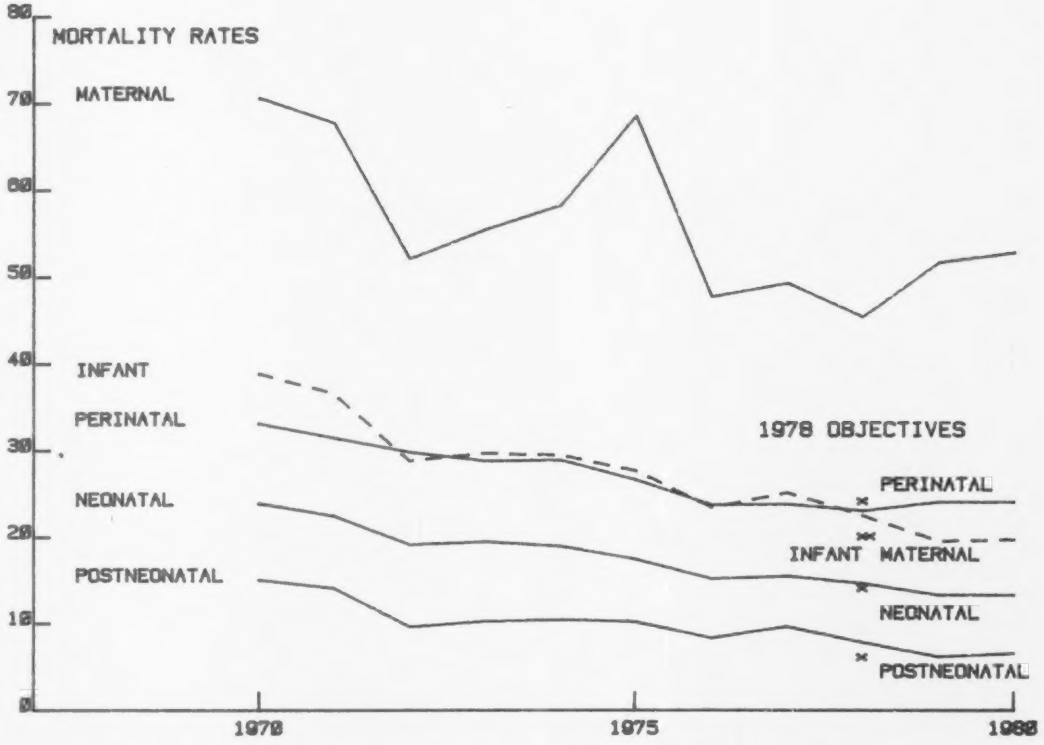


FIGURE 20 Infant and Maternal Mortality Rates and 1978 Objectives, 1970-80: Cuba

Note: Rates per 1,000 live births, except for maternal mortality (per 100,000 live births).

To achieve these goals, government policies have concentrated medical services and personnel in the provinces with the highest infant mortality rates. On the programmatic level, maternal and infant services have been integrated into the national health system: technical norms have been established for obstetrical and pediatric specialties, increasing the number of physicians, specialists, and facilities to ensure better coverage for prenatal, infant, and pediatric care. Early pregnancy detection, institutional deliveries of births, and neonatal services have been developed to treat newborns with low birthweights and various pathologies. Rural maternity homes have also been established, where women living in inaccessible areas or qualifying as high-risk cases can stay during the last few weeks of pregnancy. Finally, priority attention has been given to follow-up of high-risk pregnancies ("dispensarization") among women with hypertension, toxemia, diabetes, and various other pathologies, with special consultations for moderately high-risk pregnancies (smoking mother, Rh negative factor, atypical pregnancy history, etc.).

There are indications that induced abortion has also been used as a therapeutic tool for women with high-risk pregnancies. More recently, efforts have been initiated to reduce the incidence of abortion by increasing the use of modern contraceptives. These policies, greatly facilitated by the high proportion of births delivered in hospitals (77 percent in 1966 to 98.5 percent in 1980), have led to substantial declines in infant and maternal mortality, as shown in Tables 64-67.

The data in Tables 64 and 65 show that infant mortality rates have declined in all regions and provinces in the country, with no pronounced provincial differentials by 1980. The national infant mortality rate was reduced nearly 50 percent between 1970 and 1980. Although infant mortality rates are lower in urban than in rural areas, the differentials tend to be narrow, especially in some regions. For instance, in 1980, infant mortality rates ranged from 14 deaths per 1,000 live births in Matanzas to a high of 24.1 recorded in Guantanamo province. Provincial infant mortality rate differentials, although considerably narrowed, also reflect the same distribution as that previously discussed for fertility differentials. The infant mortality rate was below or near the national average, ranging from 14 to 19.7 infant deaths per 1,000 live births in the provinces of La Habana, Ciudad de la Habana, Matanzas, Villa Clara, Cienfuegos, Sancti

TABLE 64 Infant Mortality Rates, by Former Provincial Division and Rural-Urban Residence, 1973-75: Cuba

	Infant Deaths per 1,000 Live Births		
Province	Urban	Rural	Rural/Urban Ratio
Cuba	26.1	31.1	1.19
Pinar del Rio	23.5	28.4	1.21
La Habana	24.8	27.1	1.09
Matanzas	23.0	24.9	1.08
Las Villas	20.6	21.4	1.04
Camaguey	32.2	43.8	1.36
Oriente	28.9	33.0	1.14

Source: Comite Estatal de Estadisticas and CELADE (1980a:Table 8).

Spiritus, and Holguin; was moderately low at 20.3 to 22.3 in Camaguey, Ciego de Avila, Pinar del Rio, Las Tunas, and Santiago de Cuba; and was somewhat higher at 22.4 to 24.1 in Granma and Guantanamo. The only exception was the small municipality of Isla de la Juventud, which, in 1980, recorded a very low infant mortality rate of 16.2, but relatively high fertility.

The largest remaining infant mortality differentials are by educational attainment of mothers. Rates for women with 3 years or less of primary education are over 40 percent higher than for those with a university education (see Table 66). Similar patterns, though with some minor deviations, can be observed by place of residence and mother's educational attainment in the different regions of the country (Table 67). Table 67, which classifies provinces according to pre-1976 divisions, shows some reversals of the typical rural-urban differentials; an example is Pinar del Rio, where infant mortality was highest among women with completed primary education and surprisingly low, at 19.5, among rural women with incomplete primary education. As noted above,

TABLE 65 Infant Mortality Rates, by Present Provincial Division, 1970-80: Cuba

Province	Infant Deaths per 1,000 Live Births										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980[a]
Cuba	38.7	36.5	28.7	29.6	29.3	27.5	23.3	25.0	22.3	19.4	19.6
Pinar del Rio	33.5	33.2	27.9	29.5	23.8	27.7	25.2	29.4	26.1	20.4	20.5
La Habana	36.9	31.9	29.2	26.7	33.6	30.1	22.6	19.1	18.0	19.0	15.6
Ciudad de la Habana	39.5	25.7	24.3	22.2	24.8	24.8	20.2	21.7	17.7	16.2	17.4
Matanzas	38.7	34.8	23.4	24.3	24.8	22.6	21.2	22.8	19.6	14.9	14.0
Villa Clara	34.9	29.6	21.7	22.5	18.7	17.8	17.2	17.2	16.8	15.6	18.2
Cienfuegos	38.1	35.2	24.3	21.8	24.1	20.5	17.1	18.4	20.9	17.3	18.1
Sancti Spiritus	35.8	38.2	27.4	23.5	24.6	21.3	18.2	18.2	23.0	20.5	18.8
Ciego de Avila	40.3	43.5	27.1	36.0	41.0	32.6	26.4	23.4	17.2	20.2	21.0
Camaguey	43.1	47.6	35.8	37.2	41.0	34.9	26.5	27.4	23.2	18.3	22.3
Las Tunas	36.5	50.3	37.2	29.7	31.3	34.5	25.7	28.5	22.3	26.1	21.5
Holguin	38.3	45.1	30.7	34.3	34.6	33.0	29.0	31.0	30.9	18.3	19.7
Granma	45.7	41.0	35.1	38.8	33.4	26.9	24.7	29.3	26.1	23.9	22.4
Santiago de Cuba	36.3	32.7	26.6	32.0	28.5	28.1	23.6	29.1	23.4	19.5	20.3
Guantanamo	41.8	44.4	36.6	35.3	30.0	26.1	23.7	24.4	24.1	24.1	24.1
Municipality Isla de la Juventud	51.1	45.5	54.6	30.0	46.5	28.0	21.0	21.8	25.9	14.7	16.2

[a] Provisional.

Sources: 1970-79 figures: Comite Estatal de Estadisticas and CELADE (1980a:Table 7). 1980 figures: Ministerio de Salud Publica de Cuba (1981:Table 8).

TABLE 66 Infant Mortality Estimates, by Educational Attainment of Mother and Rural-Urban Residence, 1974: Cuba

		Mother's Educational Attainment				
		Primary (years completed)				
Region	Total	0-3	4-5	6	Intermediate	University
Total	28.4	35.0	30.0	26.1	24.3	20.5
Urban	26.1	35.9	33.0	25.4	23.5	20.1
Rural	31.1[a]	34.1	28.1	26.6	27.6	--

[a] Estimate based on data from the vital register; others from survey data.

Source: Comite Estatal de Estadisticas and CELADE (1980a:Table 11).

estimates based on the 1979 National Demographic Survey do not corroborate the official infant mortality statistics for reasons that are unclear (see Appendix 2). Some of the deviations from expected differentials may be associated with estimation biases related to sample size or a possible misreporting of abortions as dead children; others may simply reflect concerted medical efforts to reduce infant mortality among certain sectors of the population.

In sum, the Cuban health system provides almost universal coverage to all Cubans regardless of social class or place of residence. As a result, the country has achieved health and mortality standards comparable to those found in the more economically advanced countries. Life expectancy at birth exceeds 70 years; infant mortality is only somewhat higher than in developed countries and much lower than in most developing nations. The cause-of-death structure of mortality is dominated by degenerative diseases because mortality from infectious causes has been sharply reduced. Infant mortality has declined rapidly since 1972, reflecting a variety of factors: the gradual recovery in numbers of trained physicians; the impact of the maternal and infant care program; hospital deliveries; declines in mortality from acute diarrheal

TABLE 69 Estimated Deficit of Adequate Housing (in 1,000s of units), 1970-85: Cuba

	1970	1971-75	1976-80	1981-85
Housing deficit in 1970 according to estimates based on census data	1,045[a]			
Estimated number of housing units that need to be replaced during five-year period because of deterioration		230	172	81
(yearly average)		(46)	(34)	(16)
Estimated number of housing units required during five-year period to accommodate demographic growth		162	186	200
(yearly average)		(32)	(37)	(40)
Yearly average number of housing units required to replace deteriorated units and to accommodate demographic growth		(78)	(71)	(56)
Cumulated housing deficit at the end of each five-year period		1,437	1,715	1,914
Housing units built in each five-year period[b]		80	82	
(yearly average)		(16)	(15.4)	
Net deficit at the end of each five-year period		1,357	1,633	
Absolute increment in housing deficit during each five-year period		312	276	
(yearly average)		(62)	(55)	
Net deficit at the end of 1980 after rough adjustments for emigration, housing built under private initiative, and slower population growth[c]				1,500

[a] As of December 31, 1970.

[b] Official data.

[c] Rounded to 1.5 million units from the actual resultant figure of 1.63 million units.

Sources: Data from the 1970 Cuban Census of Population and Housing and estimates: JUCEPLAN (1976:54-63). Data on official housing construction: Mesa-Lago (1981:Table 46).

and infectious and parasitic diseases, related to improvement in sanitation and earlier detection and medical treatment; and the rapid decline in national fertility promoted through use of abortion and contraception. This rapid decline in infant mortality should improve individual perceptions of higher child survival and reduce the demand for surviving children.

Housing

One of the factors associated with Cuba's fertility decline, especially in urban areas, is a housing shortage. Couples may have to postpone marriage because they cannot establish a separate household or delay or limit childbearing because they have inadequate housing space.

Cuba's housing problem is longstanding, characterizing both the pre- and postrevolutionary eras. According to the 1953 census, over 40 percent of the housing was classified as "fair" and 15 percent as "bad." Three-quarters of the rural population resided in poor-quality housing, in comparison to 30 percent of the urban population (Gonzalez et al., 1978). According to different estimates, the deficit of "adequate" housing by the late 1950s amounted to somewhere between 250,000 and 700,000 units, 655,000 being the figure most often quoted (Acosta and Hardoy, 1973; Mesa-Lago, 1981; Roca, 1980b).

Two decades later, the housing situation had worsened considerably for a number of reasons. First, the government had allocated a considerable amount of national construction and labor resources to productive sectors (roads, port and agricultural facilities, factories) and service sectors (schools, health facilities) rather than to housing. Economic inefficiencies and various material shortages also contributed to the low rate of housing construction. Deterioration of the existing housing stock, especially in urban areas, was an additional factor. In depicting the situation in Havana, Roca (1980b:72) writes as follows:

> In 1978, the administrator of the city of Havana estimated that 250,000 dwelling units (50 percent of the total) were in need of repair and that, of these, 30,000 were propped-up by beams and 40,000 were declared uninhabitable.

The effect of Cuba's demographic patterns on the housing shortage is complex. On the one hand, the country has lost over 800,000 people through emigration. The housing abandoned by these emigrants has been expropriated by the government and in most cases distributed to those in need by local CDRs and work centers. Thus, emigration has helped to ease the housing shortage. On the other hand, since the children born in the baby boom of the early 1960s are now approaching adulthood and will soon be forming their own reproductive units, it can be anticipated that they will make the present housing deficit even more acute.

Government figures in Table 68 show a total of 85,447 housing units constructed between 1959 and 1963 (26,050

TABLE 68 Housing Construction, 1959-80: Cuba

Year	Housing Units Built
1959-63	85,447
1964	14,200
1965	5,040
1966	6,271
1967	10,257
1968	6,458
1969	4,817
1970	4,004
1971	5,014
1972	16,807
1973	20,710
1974	18,552
1975	18,602
1976	15,127
1977	20,024
1978	17,012
1979	14,498
1980 (Goal)	15,000
1959-80	297,840

Sources: Roca (1980b:Table 1); Mesa-Lago (1981:Table 46).

in the rural areas). Construction of new housing decreased to about 56,000 units from 1964 to 1971. Units constructed during this period were concentrated in the less developed rural provinces of Pinar del Rio and Oriente, as well as in urban La Habana. Housing construction has accelerated since 1972, averaging approximately 17,700 units per year from 1972 to 1979, for a total of 141,000 units.

As part of the effort to redistribute income, all properties have been nationalized, and tenants pay reduced rents to the state, corresponding to no more than 10 percent of monthly wages. Newly available housing is allocated primarily on the basis of need and worker productivity. Until 1978, apartment units were equipped for free with television, furniture, gas range, and refrigerator. By 1979, the cost of furnishing units was met by payment through credit.

Table 69 provides a gross summary of the housing shortage in Cuba during the 1970s as derived from Cuban estimates and data on annual housing construction, shown in Table 68. The table shows official estimates of housing needs throughout the period 1970-85, based on 1970 census data on housing and a series of official assumptions regarding the useful life of dwellings, projected population growth rates, and average household and dwelling size. To err on the conservative side, the figures shown refer to the one set of assumptions that projects lower housing needs. These projections were adjusted by subtracting the official number of housing units constructed by the state during each five-year period. The figures exclude minor private housing construction efforts, largely limited to rural areas (upgrading of traditional housing of substandard quality), as well as subdivision of existing units, but include housing made available through emigration.

Table 69 indicates that during the 1971-75 period, the deficit in adequate housing rose by approximately 62,000 units per year, and during the 1976-80 period, by approximately 55,000 units a year. Based on the data in Tables 68 and 69, it can be concluded that during the 1970s, the housing deficit increased by nearly half a million units, reaching approximately 1.5 million units by 1980. This latter figure allows for the construction of an unspecified number of private-sector housing units, upgrading of previously inadequate units, rough adjustments for emigration (approximately 220,000 persons during the 1970s), and the sharp decline in the rate of population

TABLE 67 Infant Mortality Estimates, by Educational Attainment of Mother, Former Provincial Division, and Rural-Urban Residence, 1974: Cuba

	Mother's Educational Attainment		
Province	Primary Incomplete	Primary Complete	Intermediate and University
Pinar del Rio			
Total	23.0	34.5	26.0
Urban	30.2	31.1	23.5
Rural	19.5	34.8	31.3
La Habana			
Total	28.9	20.6	23.0
Urban	22.7	21.2	22.7
Rural	--	--	--
Matanzas			
Total	34.3	26.5	13.4
Urban	--	--	12.5
Rural	25.3	25.4	18.7
Las Villas			
Total	24.7	21.0	19.4
Urban	19.1	22.6	13.2
Rural	28.0	18.8	20.4
Camaguey			
Total	37.8	36.2	32.0
Urban	35.3	39.3	31.0
Rural	40.2	31.0	27.6
Oriente			
Total	34.7	27.5	27.7
Urban	40.0	25.6	26.8
Rural	32.4	28.5	30.0

Note: -- indicates sample size too small for estimating rate.

Source: Comite Estatal de Estadisticas and CELADE (1980a:Table 14).

growth since 1973. However, even with the necessary adjustments, the figure amounts to an increase in the housing deficit during the 1970s of approximately 50 percent. As the baby boom cohort continues to enter the marital age groups during the 1980s, the demand for housing will continue to increase.

Recent national data pertaining to the late 1970s indicate that among Cuba's total population of 9,272,211, approximately 5,929,644 lived in houses, 1,238,323 in apartments, 1,697,740 in bohios (traditional rural housing constructed of palm bark or palm leaf), 381,103 in rooming houses, and 25,401 in other types of housing (Comite Estatal de Estadisticas, 1981c). With no assumptions made about the quality of housing, over 2 million people, or a minimum of 22 percent of the population, could be classified as living in substandard housing in bohios or rooming houses.

The last decade has witnessed improvement in rural housing standards. One aspect of the rural housing program has been "micro-urbanization," the resettlement of dispersed rural populations in modern, well-equipped centers of some 250 families each, located near a factory, rural cooperative, or cattle farm. These settlements consist of multi-storied apartment buildings with running water, sewage disposal, and electricity, plus schools and health clinics. By 1979, 353 rural communities of various sizes had been constructed, housing approximately 150,000 people, or 5 percent of the total rural population. An indeterminant number of rural dwellings have also been upgraded through the provision of cement or wooden floors and latrines, resulting in considerably improved sanitation and a reduction in infant mortality (Anonymous, 1973). Electrification has also been extended to many rural areas of the country, especially during the 1970s. The provision of other modern facilities, such as running water, has increased in rural areas, but to a more limited extent.

Although improvements in housing have been made, especially in rural areas, on balance the housing situation has worsened because of population growth, low housing construction rates, and deterioration of the existing housing stock. There are two important implications of this housing situation for Cuba's fertility decline. First, results of small-scale surveys indicate that the urban housing shortage has the effect of postponing marriage, encouraging divorce, and limiting family size. For instance, a small survey conducted in

1970 among 69 divorced couples in Havana found that virtually all couples preferred to live by themselves, but two-thirds had lived with relatives because of the housing shortage (Hernandez et al., 1973). Increased two-generational living arrangements have delayed childbearing for some couples, as implied by a variety of small-scale surveys. Two surveys of women receiving abortions in a Havana hospital and polyclinic suggest that overcrowded housing conditions may be a factor in the decision to terminate an unplanned pregnancy. Although 43 percent of the women had never had a live birth, the majority of 100 women requesting abortion during a 2-month period in 1979 at the Hospital Eusebio Hernandez reported living in extended families with at least five persons in the household, higher than the national average household size of 4.5 and that of Ciudad de la Habana, 3.9. In the Policlinico Parraga survey, among a decidedly small sample of 43 women who had previously requested termination of pregnancy, the majority reported two or more persons per bedroom (Gonzalez Perez, n.d.). Data gathered on a small sample of males, discussed above, indicate that the housing shortage was the principle reason for postponing marriage among the single men and a major reason for limiting family size in the near future among the married men (Gonzalez Perez, 1981). All of these studies are exploratory and permit limited generalization. However, the rise in marriage rates during periods of emigration also suggests that, at least in urban areas, the scarcity of housing delays marriage or limits family size until the existing stock can be redistributed.

A second implication of Cuba's housing situation for fertility decline is that increased "urbanization" of the rural population has probably not been a major contributor to fertility decline, given the relatively small number of rural inhabitants who have been resettled. The majority of the agricultural labor force still lives in dispersed housing rather than within these centers. However, improvements in rural sanitation and the provision of utilities, in conjunction with the maternal and infant care program, may be indirectly associated with rural fertility decline through a reduction in infant mortality.

NOTES

1 Racially, the country's present population descends primarily from European, mainly Spanish, and African stock. As of 1953, 73 percent of the Cuban population was classified as white, 12.4 percent as black, and 14.5 percent as mestizo; less than 1 percent (0.32 percent) was of Asian descent (Republica de Cuba, 1955). Over the centuries, there has been a considerable intermingling of the races, and the proportion of Cubans of mixed racial composition is high. The weight of the native Indian population is very limited; the original inhabitants of Cuba--primarily Taino and Ciboney Indians, estimated at approximately 100,000 in the early 1500s, either perished or were gradually assimilated by the new immigrant groups centuries ago.

2 Despite the primarily agricultural character of its economy, Cuba has traditionally been a highly urbanized country. By 1931, over 50 percent of the country's population was urban; by 1981, seven of every ten Cubans lived in urban localities. The area of metropolitan Havana, seat of the country's capital, has accounted for between 20 and 21 percent of the national population since the 1950s, although in recent years, Havana's growth rate has declined and become comparable to that of the country overall.

3 As noted in Table 4, Cuba's population density per square kilometer increased dramatically between 1899 and 1981. With 87 persons per square kilometer in 1981, Cuba has one of the highest population densities among Latin American countries. However, in comparison with that of other heavily settled Caribbean and Central American countries (e.g., Dominican Republic, Haiti, and El Salvador), Cuba's density is significantly lower.

4 This is defined as the average number of female children a woman would have if she survived to the end of her childbearing years and, if throughout, she were subject to a given set of age-specific fertility rates and a given sex ratio at birth. This number provides a measure of replacement fertility in the absence of mortality.

5 Fertility levels have been consistently highest in the province of Oriente, where the proportions of blacks and mestizos were the highest according to the 1953 census (14.6 percent of the total provincial population was black and 26.2 percent mestizo). However, the relationship is not clear since the effect of race on fertility cannot be assessed independently of many other socioeconomic variables, such as education, income, or occupation. Moreover, no direct assessment can be made for the postrevolutionary period; the Cuban government does not release tabulations of social statistics by race, although data on race were collected in the 1970 census.

6 The estimates derived through use of the own-children technique are based on the work conducted by Hugo Behm Rosas of CELADE-Costa Rica and Juan Carlos Alfonso Fraga of the Direccion de Demografia of the Comite Estatal de Estadisticas (CEE), with the assistance of Oscar Ramos Pinol of CEE and Domingo A. Primante of CELADE-Costa Rica (see Comite Estatal de Estadisticas and CELADE, 1981).

7 The intent of the question on additional children desired was to ascertain the number women would like to have by the end of their reproductive life. However, instructions to the interviewers indicated that the questions should pertain not to an ideal number of children, but to the number desired in the near future, which could be conditioned by study, employment, family relations, or housing conditions. Thus, some women may have interpreted the question as related to spacing desires (additional number desired in the immediate future), rather than to completed desired family size.

8 Women for whom no response was recorded on the number of live births (9 percent) or surviving births (11.5 percent) were placed in the zero-children category, rather than being eliminated from the sample. Since the original sample also included single, divorced, separated, and widowed women, it is not clear what proportion of the "no response" category consisted of

women in union. Among women of reproductive age (14-49) the total proportions childless were 11.3 percent among married women and 9.8 percent among those in consensual union. Among single women, the proportion childless was 97.6 percent; among women of other marital statuses, this proportion was 12.7 percent.

9 While low fertility desires are to be expected given Cuba's current low fertility level, it is not clear whether women would actually prefer to have greater numbers of children. Questions on ideal family size were not included in the 1979 National Demographic Survey, and although such data were gathered in the early community fertility surveys of the 1970s, they have not been published.

10 As part of the Family Code legislation enacted in 1975, the legal age at marriage in Cuba was established as 18 for both men and women. Under exceptional circumstances and for justified reasons, parents, other relatives, or the regional people's court can grant permission for those younger than 18 to formalize their marriage, as long as the woman is at least 14 and the man at least 16 (Ministry of Justice, 1975). Originally, the lower limit for female age at marriage was set at 12; however, when voting on the proposed statute among the local constituencies of *poder popular* (popular power) demonstrated opposition by a minority of elected candidates, this age was raised to 14.

11 No data are available on the proportion of legal marriages preceded by cohabitation. Data analyzing marital status by race and education have also not been published, although the 1970 census gathered information on both.

12 Slight differences also existed in the census procedure used to ascertain marital status in 1953 and 1970: in 1970, couples were classified as living in consensual union if one partner residing in the same household declared this marital status, regardless of what the other declared; this approach was not taken in the 1953 census.

13 The survey data pertain only to marital status at the time of the survey. Data on the number of previous unions, the date of onset and termination of each, the type of union (legal or consensual), reason for termination (divorce, widowhood, legalization of consensual union), or number of births within each union were not collected.

14 According to the 1975 Family Code, at the time of divorce, joint properties are divided. However, alimony lasts a relatively short period of time. If one party is not employed and lacks other means of support, temporary alimony is paid by the other party for 6 months if there are no children in his or her care and guardianship, or for 1 year if there are, so the beneficiary can obtain employment. If one party is unable to work because of age, disability, illness, or similar impediments, alimony will continue as long as that impediment exists.

Patria potestas (parental rights) is usually granted to both parents, although it can be granted to only one or neither if this is in the interest of the children. Guardianship and care of the child is vested in one parent. Support of the children is a duty of both parents even if they do not have patria potestas or guardianship and care, or if the children are enrolled in an educational institution. In accordance with this rule, the court's decree of divorce sets the amount of child support to be paid by the nonguardian parent, determined by the childrens' normal expenses and the income of the parents (Ministry of Justice, 1975).

15 The medium estimate assumes that the crude birth rate of 17.0 in 1975-80 increases to 18.2 after 1985 and declines to 17.1 by 1995-2000. The crude death rate of 6.0 for 1975-80 increases slightly to 7.2 in 1995-2000 because of the aging of the population.

16 Data on the U.S. Cuban-born population and U.S.-born population of Cuban parentage show an increase from about 5,300 in 1870 to about 15,100 in 1910 and 18,500 in 1930. Following World War II, substantial immigration occurred, and the number of Cuban-born persons residing in the United States increased from about 18,000 in 1940 to 79,200 in 1960. By 1960, the number of first-generation U.S.-born persons of Cuban parentage had increased to about 45,300. By 1970, because of postrevolutionary emigration, the U.S. Cuban-born population had increased to 439,000, while the U.S.-born Cuban population (including an unknown number of second and subsequent generations) had risen to 122,000. Altogether, approximately 561,000 Cubans and their descendants were living in the United States in 1970 and about 700,000 by the late 1970s (Jaffe et al., 1980).

17 Isla de la Juventud was excluded from the calculation of correlation coefficients because of the concentration of educational facilities on the island. These correlations are only suggestive since it is not possible to obtain more refined nuptiality measures, given the high prevalence of consensual unions, excluded from the nuptiality measures and the legalizations of consensual unions that are included.

18 The data on breastfeeding are retrospective and therefore subject to response and rounding error. They were gathered in interviews with the children's mother or primary caretaker and conducted by pediatric social workers as part of the regular postpartum pediatric consultation. If the respondent missed the scheduled appointment, nursing personnel or health workers visited the residence to complete the interview. The survey was conducted in October 1973 when the infants were 7 months old.

19 A surprisingly high proportion of the women, especially those with no or little education, were not following the suggested norms of food supplementation developed by the Ministry of Public Health. They tended to supplement infant diets with carbohydrates rather than foods high in protein, reflecting cultural preferences rather than the influence of food prices.

20 The extension program originally planned for 1979-82 has been rephased to carry the project to 1985. UNFPA allocations for the 1982-85 period amount to nearly $2,967,670 (UNFPA, 1982a).

21 The first survey, conducted in 1971, involved 1,545 women residing in the region of Plaza de la Revolucion, one of six regions comprising the metropolitan area of Havana, province of La Habana. A second survey, in 1973, was conducted of 995 women in the city of Santa Clara, capital of the central province of Las Villas. Third, a census of 3,826 women was taken in the municipality of Yateras, a completely rural, mountainous municipality in the province of Oriente, which was the province of highest fertility in 1973. The fourth and fifth studies, conducted in the region of Marianao and the city of Bauta, on the periphery of Havana, interviewed 2,549 and 1,545 women, respectively. All samples were probability samples of women in their reproductive years, 15-49, with the exception of the Yateras study, which was a census of all women of reproductive

age. The 1980 survey was conducted in Arroyo Naranjo, an area with semi-rural characteristics at the edge of the city of Havana, with a sample of 732 women in union aged 15-44.

22 Approximately 13.5 percent of the women surveyed in Arroyo Naranjo reported that they had experienced an unplanned pregnancy while using contraception. Two-thirds of these women associated their contraceptive failure with the use of traditional methods (jelly, douche, condom, rhythm, and withdrawal); approximately 10 percent reported using the pill, 18 percent the IUD, and 6 percent an unknown method at the time of pregnancy.

23 National data on the incidence of abortion prior to 1968 have not been tabulated. Although the conditions allowing abortion were liberalized in late 1964, educational efforts were initially directed to high-parity women. Access to abortion during these years was dependent upon the disposition of the director of the institution; access to physicians was reduced because of emigration; and clandestine abortion continued. Therefore, the data provided in Table 38 for 1968-69 probably underestimate the actual incidence of abortion.

24 One recent small-scale hospital investigation concluded that 56 percent of "other abortions" involved incomplete spontaneous and incomplete provoked abortions, and the other 44 percent involved therapeutic curettage (Librada Morales, in UNFPA, 1982b); this indicates that induced abortions still occur outside the health system.

25 Anesthetic or septic shock, sepsis, and heart failure were the main causes of the 1980 abortion-related deaths. Five of the eight deaths occurred among women aged 15-24, in contrast to the age distribution of women at time of death recorded for previous years (1968-78), during which only one legal abortion death in eleven was recorded for this age group. No pattern is discernible in the provincial distribution or hospital location of deaths. One possible, but unsubstantiated, explanation is that only deaths associated with legal abortion, initiated within the public health system, were previously classified as legal abortion deaths; other abortion-related deaths (incomplete abortions initiated outside the health system) may have been classified as total abortion deaths rather than legal abortion deaths. A recent

evaluation concluded that the use of surgical curettage, which also requires anesthesia, may be implicated; the evaluation recommended the use of suction curettage and the establishment of written procedures and norms for pregnancy termination, in addition to the eligibility criteria currently specified in guidelines (UNFPA, 1982a, 1982b).

26 In 1976, abortions conducted in Ciudad de la Habana represented one-quarter of all abortions conducted in the country, rising to 26 percent in 1977 and stabilizing at 29-30 percent in 1978-80 (Direccion Provincial de Estadisticas, Ciudad de la Habana, n.d.). According to the results of the 1979 National Demographic Survey, 22 percent of the female population aged 15-49 resided in Ciudad de la Habana.

27 The Agrarian Reform Law of May 1959 set a maximum of 30 caballerias (1 caballeria = 13.4 hectares or 33.1 acres) for farms, except for "range land and farms that were 50 percent more productive than the national average; these could be as large as one hundred caballerias. Foreign and sugar-mill ownership of land was prohibited, as were tenancy, sharecropping, and similar arrangements. Former tenants, sharecroppers, and squatters would get two caballerias of the land they had tilled free; the owners could then be compelled to sell them three more caballerias, for a total of five. The remaining land would be given, in order, to peasants who had been evicted in years past, peasants who had less than two caballerias of land, agricultural workers from the region, peasants being resettled, and agricultural workers being resettled. . . . Compensation for expropriated land, to be paid in bonds over twenty years at 4.5-percent interest, was never paid" (Dominguez, 1978:438).

28 It should be noted that Cuba has been a heavy recipient of Soviet aid during the last two decades. Without this assistance, its economic performance would have been decidedly poorer. Between 1961 and 1979, Soviet economic assistance to Cuba, exclusive of military aid, amounted to an estimated $17 billion (Blasier, 1979; National Foreign Assessment Center, 1981). Even in 1978, a relatively prosperous year, Soviet assistance accounted for between one-fourth and one-third of Cuba's gross national product (Recarte, 1980; Theriot and Matheson, 1979). By

early September 1982, Cuba had begun negotiations with Western banks to reschedule the payment of its foreign debt (in excess of $3 billion), since it was unable to meet the original conditions under which the loans were made.

29 Consumer durables normally available through the parallel system were also used as material incentives to increase worker productivity during the early 1970s. For instance, televisions and refrigerators were awarded to highly productive workers through labor assemblies and party and union recommendations. State-constructed housing and furnished homes left by emigres have also been distributed by neighborhood Committees for the Defense of the Revolution (CDRs) to those demonstrating need and productivity (Dominguez, 1978).

30 Exchange rates are artifically set by the Cuban government. The peso has been tied to the ruble, whose exchange rate is set by the Soviet government. Parallel with the gradual devaluation of the dollar, particularly in 1971 and 1973, the value of both the ruble and peso was raised. In 1978, the official exchange rate was set at $1.31 U.S. for one Cuban peso (Mesa-Lago, 1981).

31 This estimate of unemployment is based on figures for the economically active population minus figures for the population in the labor force. The economically active population was defined in the 1979 National Demographic Survey as those aged 14 and above of both sexes currently working, those temporarily unemployed and currently seeking work, and those seeking employment for the first time. The concept of labor force refers to the population employed in the week preceding the survey. These estimates are based on a sample survey of 4 percent of all Cuban households. The 1953 census utilized two distinct definitions to identify employed persons: the concept of the labor force, referring to the type of activity engaged in by each person during the week prior to the census and the concept of remunerated worker, referring to workers usually involved in an occupational activity for which they receive income, including those currently employed and those usually employed but not during the previous week. The data cited in this study on female employment for 1953 refer to the latter definition of employment, since information on economic sector and occupation were only gathered for

this group. In addition, the census of 1953 was conducted during the sugarcane harvest. The census of 1970 utilized the concept of labor force, referring to the type of activity engaged in by each person during the week prior to the census. Similarly, the 1979 National Demographic Survey also utilized the concept of labor force, referring to the previous week.

32 Since November 1980, state and cooperative enterprises and private enterprises, such as some farms and small repair shops, have been allowed to hire their own workers without mediation from the Ministry of Labor, which had previously assigned workers to positions. The goal of this policy is to free individual enterprises from inefficient bureaucratic practices. Many state enterprises will now be classified as self-financing and will have to show an annual profit. This new economic management and planning system, including strict accounting methods, manpower controls, cost accounting, and incentive pay, was reportedly functioning in all 441 state enterprises by mid-1981 (Latin America Weekly Report, July 31, 1981).

33 During the 1970s, full-time boarding schools for secondary education were constructed, based on the work-study principle. By 1978-79, there were reportedly 402 escuelas en el campo with 217,000 students, accounting for 34 percent of total secondary enrollment (JUCEPLAN, C.E.E., 1979).

34 In addition, technical medical personnel are trained in approximately 30 specialties, with quotas, plans of study, and allocation of graduates to provincial services set by the Central Planning Agency (JUCEPLAN) and the Ministry of Public Health. By 1980, there were 14,156 nurses, 24,357 other middle-level technicians, and 17,274 auxiliary nurses and dental assistants (Ministerio de Salud Publica de Cuba, 1981).

APPENDIX 1

DATA SOURCES

Analysis of the Cuban demographic situation is facilitated by an abundance of data, including eight censuses since 1899 (1899, 1907, 1919, 1931, 1943, 1953, 1970, and 1981). The census of 1953 provides the most recent prerevolutionary data with the 1970 national census and preliminary results from the 1981 census available for the postrevolutionary period. Census data prior to 1959 are considered fairly accurate according to CELADE evaluations, with the 1931 census judged to be the most deficient (see Appendix 2). Cuba's national statistical system is coordinated at the ministerial level by the *Comite Estatal de Estadisticas* (CEE--the State Committee for Statistics), which publishes data on births, deaths, marriages, and divorces, as well as the *Anuario Demografico de Cuba*. The Central Planning Board (JUCEPLAN) directs the operations of the National Census Office (ONCE), which includes the Department of Demography. Teaching, research, and advisory services in demography are also provided by the Center for Demographic Studies (CEDEM) of the University of Havana. Data are gathered in each of the 169 municipalities in accordance with models developed by the Committee. Births are registered at hospitals and in the State Civil Register, and deaths are registered by the Ministry of Public Health (MINSAP) following World Health Organization guidelines. All health statistics are compiled and processed by the Ministry of Public Health, an organization within the Central Planning Board (JUCEPLAN) (Salcedo and Joly, 1979).

Until 1964, vital statistics were calculated on the basis of civil registration data, although the latter were considered more deficient than census data. For years since 1965, annual data on fertility published by the Cuban government correspond not just to the actual number of births registered, but to estimates corrected for underregistration through use of the National Registry of Consumers, which records data on the number of surviving births as the basis of the rationing system. The proportion of births delivered and recorded in hospitals increased from 77 percent in 1966 to 98 percent in 1978. In 1978, approximately 99 percent of all Cuban births were registered the same year (Ministerio de Salud Publica de Cuba, 1979; Comite Estatal de Estadisticas, 1980). In 1970, Cuba revised its previous mortality and fertility statistics in accordance with the results of the 1970 National Census of Population and Housing. Statistical procedures for collecting morbidity and mortality data, last revised in 1977, include a continuous registration of perinatal deaths since 1968. The accuracy of these statistics is evaluated in Appendix 2. Future plans also exist for a National Statistical Information System, providing data at the national, provincial, and municipal levels.

Despite the nearly complete coverage achieved in birth registration, more detailed data on national fertility trends and differentials are usually limited to provincial comparisons and age-specific rates. Recently, however, the State Committee on Statistics, the Institute for Health Development, and the Center for Demographic Studies at the University of Havana have initiated additional basic research on mortality and fertility. The National Demographic Survey of 1979, conducted by the State Committee on Statistics, offers data on levels and trends in mortality and fertility, desired family size, and socioeconomic and geographic differentials in fertility and mortality. This survey also served to perfect methods and procedures for the recent 1981 Population and Housing Census. The Institute for Health Development is conducting a series of studies on infant and perinatal morbidity and mortality, and the National Commission on Maternal Mortality analyzes all maternal and infant deaths. A 1972 anthropometric study gathering data on the physical growth of 56,000 Cuban children from birth to age 20 has also been conducted by the Ministry of Public Health, the University of Havana, and the Central Planning Board, with assistance from the Federation of Cuban Women.

Data on fertility regulation pertain primarily to aggregate national statistics on total abortions, legal abortions, and other abortions, available on an annual basis, as well as abortion-related mortality. Tabulations on the incidence of reported abortions by age group, parity, or the socioeconomic characteristics of abortion recipients have been gathered in KAP-type community fertility surveys and local polyclinic and hospital investigations, but not on the national level. Data on knowledge of contraceptive methods, contraceptive prevalence, and previous use are similarly limited to periodic community fertility surveys conducted in the early 1970s and one survey conducted in 1980. No data have been collected on rates of continuation, reported method side-effects, or contraceptive intentions, which would be particularly useful for service delivery. However, a future fertility survey of 3,000 households in Havana, rural Guantanamo, and a new community with an average birth rate will be undertaken by the Center for Demographic Studies of the University of Havana and the Federation of Cuban Women, with the assistance of the International Labour Organization (ILO), Population and Labor Policies Programme.

APPENDIX 2

AN EVALUATION OF CUBAN DEMOGRAPHIC STATISTICS, 1938-80

by Kenneth Hill

This evaluation is based on the following data sources: the population censuses of 1953 and 1970; registered births and deaths from the late 1940s to the late 1970s; two national surveys with demographic content--the 1974 National Survey of Income and Consumer Expenditure and the 1979 National Demographic Survey; and the statistics on net migration presented elsewhere in this study. These sources are discussed below in relation to fertility, mortality, migration, and population size and age structure.

FERTILITY

The principal source of information on fertility in Cuba is the sequence of registered births by age of mother, which provides age-specific fertility rates and thus total fertility by calendar years. This sequence is evaluated below by comparison with two other sources of information on fertility: lifetime fertility, or the average numbers of children ever born by age group of mother, available from the 1953 census, the 1974 survey, and the 1979 survey; and age distributions, or the actual numbers of children aged 0-4, 5-9, and 10-14, enumerated by the censuses of 1953 and 1970.

Comparison with Lifetime Fertility

Brass (1964) has proposed a procedure for evaluating current age-specific fertility rates by cumulating the rates and then interpolating between the cumulated values to obtain average parity equivalents for standard five-year age groups. These parity equivalents can then be compared with reported average parities through computation of P/F ratios representing factors by which the current fertility rates have to be adjusted to be consistent with reported average parities. If fertility in the recent past has been constant, an average of these factors over an age range regarded as most reliable can be used to correct the current age-specific fertility rates under the following assumptions: that the age pattern of the current rates is correct, and that the average parities of at least the younger women reflect the true level of fertility. Even if fertility has not been constant, as it has not been in Cuba over the last 40 years or more, lifetime fertility for women in their twenties reflects births over a fairly short period preceeding the survey; therefore, the P/F ratios for these women provide some indication of the quality of the reporting of births around the time of the survey.

The application of a slight modification (U.N., 1983) of the original procedure to the three time points available for Cuba is shown in Table A.2.1. For 1953, the P/F ratios show a U-shaped pattern with age: they dip from values above 1.0 for women under 25 to values below unity from ages 25-39, and rise again to above unity for women 40 and over. The ratio for women aged 15-19 is very high; however, it should be disregarded since it is very sensitive to the interpolation procedure and since it is frequently distorted when birth registration and census or survey data are combined, probably because of different age misreporting in the two sources. The remaining ratios average about unity and suggest approximate consistency between current and lifetime fertility levels. When interpreted in terms of fertility trends, the age pattern of the ratios suggests a recent decline in early childbearing, a recent increase between ages 25 and 34, and a recent decline at later ages, though in view of possible data errors and migration effects, such a strict interpretation is unwarranted. This application can thus be regarded as confirming a level of total fertility around 3.6 and hence a birth rate of around 28 per 1,000 for 1953.

For 1974, the age pattern of the P/F ratios is dramatically different: it shows a monotonic rise from values close to unity for women under 25 to values over 1.4 for those over 40. This pattern is typical of applications to populations with recent fertility declines; moreover, the closeness to unity of the ratios

TABLE A.2.1 Application of P/F Ratio Technique, 1953, 1974, 1979: Cuba

Age Group	Average Parity	Age-Specific Fertility Rates	Cumulated Parity Equivalent	P/F Ratio
1953				
15-19	0.183	.0589	0.088	2.07
20-24	0.917	.2056	0.782	1.17
25-29	1.770	.2036	1.850	0.96
30-34	2.547	.1389	2.714	0.94
35-39	3.168	.0791	3.253	0.97
40-44	3.606	.0287	3.516	1.03
45-49	3.992	.0042	3.588	1.11
1974				
15-19	0.221	.1190	0.219	1.01
20-24	1.114	.1890	1.077	1.03
25-29	2.213	.1310	1.886	1.17
30-34	3.067	.0880	2.451	1.25
35-39	3.513	.0187	2.686	1.31
40-44	3.877	.0093	2.753	1.41
45-49	4.055	.0023	2.783	1.46
1979				
15-19	0.162	.0960	0.176	0.92
20-24	0.992	.1520	0.871	1.14
25-29	1.854	.0990	1.506	1.23
30-34	2.661	.0590	1.909	1.39
35-39	3.242	.0102	2.058	1.58
40-44	3.677	.0051	2.094	1.76
45-49	3.933	.0013	2.110	1.86

for young women indicates that the age-specific rates obtained from registered births can be accepted as satisfactory. The application thus supports a total fertility rate of 2.8 for 1974, implying a birth rate of around 22 per 1,000.

For 1979, the age pattern of the P/F ratios shows even more clearly the effect of declining fertility, with even the ratio for women aged 20-24 being substantially above unity. Given the obvious fertility decline, no adjustment of the registered births is warranted; in the absence of indications of omission of births, the total fertility rate of 2.1 for 1979 is accepted. However, in view of the relatively high P/F ratio for women aged 20-24, the support for this value is somewhat weaker than that for the corresponding 1974 application.

Two developments of the P/F ratio procedure are specifically intended for conditions of changing fertility (U.N., 1983). One uses information on cohort parity changes between two surveys to compute an intersurvey parity distribution; this hypothetical distribution is then compared with cumulated average age-specific fertility rates for the intersurvey period in the normal way. The application of this method to the 1974-79 period is shown in Table A.2.2. Excluding the unreliable value for women aged 15-19, the P/F ratios range from 1.014 to 1.058 and show an impressive degree of consistency with age. Although the results could be interpreted as supporting an upward adjustment to registered births of about 3 percent, the direction of likely biases is upward; therefore, the results are taken as supporting the reported age-specific rates. The intersurvey estimate of total fertility--2.4--falls neatly between the 1974 and 1979 estimates. The removal of any trend from the P/F ratios supports the general accuracy of all the data used. The second approach cumulates age-specific fertility rates derived from registered births for cohorts of women and compares these cumulated values with average parities of those cohorts reported in a survey. The

TABLE A.2.2 Comparison of Period Fertility Rates with Cumulated Parity Changes, 1974-79: Cuba

Cohort Age Group, 1979	Average Parity 1974	Average Parity 1979	Cumulated Parity Change	Age-Specific Fertility Rates	Cumulated Parity Equivalent	P/F Ratios
15-19	0.0	0.162	0.162	.1015	0.187	0.87
20-24	0.221	0.992	0.933	.1600	0.921	1.01
25-29	1.114	1.854	1.673	.1055	1.594	1.05
30-34	2.213	2.661	2.121	.0625	2.006	1.06
35-39	3.067	3.242	2.296	.0350	2.243	1.02
40-44	3.513	3.677	2.460	.0145	2.361	1.04
45-49	3.877	3.933	2.516	.0035	2.407	1.05

TABLE A.2.3 Comparison of Reported Lifetime Fertility, 1974 and 1979 with Cohort Fertility Cumulated from Registered Births: Cuba

	1974 Survey			1979 Survey		
Age Group at Survey	Reported Parity	Cumulated Lifetime Fertility	P/F Ratio	Reported Parity	Cumulated Lifetime Fertility	P/F Ratio
15-19	0.221	0.254	0.870	0.162	0.212	0.764
20-24	1.114	1.127	0.989	0.992	0.979	1.013
25-29	2.213	2.158	1.026	1.854	1.842	1.007
30-34	3.067	n.a.		2.661	2.603	1.022

ratio of reported to cumulated parity represents an average correction factor for the reported births. This method has been applied using the 1974 and 1979 lifetime fertility data; age-specific fertility was cumulated from 1959 onward, allowing comparisons up to age groups 25-29 in 1974 and 30-34 in 1979. The results, shown in Table A.2.3, yield ratios very close to unity, except for ages 15-19, the age group for which the procedure used to apportion fertility rates between cohorts is least satisfactory.

To summarize, lifetime fertility data confirm the reliability of the age-specific fertility rates for 1953, 1974, and 1979, and suggest that birth registration has been effectively complete since at least the early 1950s. These data do not, however, directly confirm the fluctuations in fertility rates between the early 1950s and early 1970s, since such rates also depend on the population denominators used; the latter will have been affected by migration and are therefore uncertain.

Comparison with Age Distributions

In a population closed to migration, those aged 0-4 represent the survivors of births over the preceding 5 years, those aged 5-9 represent survivors of births 5 to 9 years earlier, and so on. If mortality rates are known, it is therefore possible to estimate the number of births for successive five-year periods preceding a census or survey from the reported age distribution. The number of births can then be used together with estimates of average population size to estimate the birth rate for each period; age-specific fertility patterns can be used together with successive female age distributions to estimate age-specific fertility rates and thus total fertility.

Such an analysis is complicated by migration: not only are numbers of births affected (negatively by emigration, positively by immigration), but also, and perhaps more importantly, the estimates of population used in calculating rates are affected. Fortunately, the effects are in opposite directions, though they will only cancel out exactly when the age pattern of net migrants is the same as that of the general population. An attempt has been made to take migration into account since it has been such an important element of population change in Cuba over the period being considered: both the 1970 and 1953 census age distributions have been reverse-projected for 15 years to provide fertility estimates for the periods 1955-60, 1960-65, and 1965-70 from the 1970 census, and 1938-43, 1943-48, and 1948-53 from the 1953 census. The mortality parameters used in these projections were taken from the following section; the age patterns of fertility used to obtain estimates of total fertility were taken from registered births; and male and female net migration totals were taken from Table 30, with the age distribution of the migrants being derived from the age structure of 1970 United States residents of Cuban origin, adjusted for mortality, who had reported an arrival date between 1965 and 1970.

The birth rate and total fertility estimates obtained through this procedure for the six five-year periods are shown in Table A.2.4, together with comparable estimates from birth registration. The agreement here is impressive. The only substantial differences are for the period 1948-53, for which the reverse-projection estimates are lower than the previous estimates by some 7 percent. Typical age misreporting patterns might account for this discrepancy, though this explanation is contradicted by the fact that the reverse-projection estimates for the period 1943-48, which would be exaggerated by the typical age exaggeration of young children, are also lower than the previous estimates. It is therefore concluded that the reverse-projection results confirm the previous fertility estimates for the late 1930s to around 1970, except that they indicate that the fertility decline in the 1940s and 1950s took place somewhat earlier and somewhat faster than had previously been supposed.

TABLE A.2.4 Fertility Estimates Obtained from Reverse-Projection of 1953 and 1970 Age Distributions Compared with Other Estimates: Cuba

	Estimates from Age Distribution			Alternative Estimates		
Period	Birth Rate	Total Fertility	Sex Ratio at Birth	Birth Rate	Total Fertility	Sex Ratio at Birth
1938-43	33.5	4.22	104.8	33.5[a]	4.00[b]	n.a.
1943-48	31.2	3.95	104.0	32.5[a]		n.a.
1948-53	28.4	3.60	104.3	30.4[a]	3.60[c]	n.a.
1955-60	26.6	3.64	104.8	27.1[d]	3.76[e]	n.a.
1960-65	34.1	4.59	104.3	33.8[d]	4.67[e]	n.a.
1965-70	30.6	4.13	104.4	31.2[d]	4.29[e]	1.048[f]

[a] From Table 4, weighting adjacent five-year values.
[b] From Table 3, for 1943.
[c] From Table 3, for 1953.
[d] From Table 6.
[e] From Table 8.
[f] From registered births, 1967-70.

Conclusions Regarding Fertility

The evaluation of Cuba's fertility trends since 1940 described above shows an abnormally high degree of consistency between the various sources of fertility information. Although there is no very strong reason for rejecting the official figures quoted elsewhere in this report, a new series of fertility estimates based on the present evaluation and regarded as the best available is presented in Table A.2.5 for five-year periods from 1940 to 1980.

MORTALITY

The present evaluation of mortality data is based on two sources of information: registered deaths and enumerated population for the years 1953 and 1970, used to assess the completeness of death registration after childhood for those years; and information on children ever born and children surviving by age group of mother from the 1974 and 1979 surveys, used to obtain estimates of child mortality for the years preceding those surveys. Results for the latter are described first below since they are

TABLE A.2.5 Fertility Estimates by Five-Year Periods, 1940-80: Cuba

Period	Birth Rate	Total Fertility
1940-45	32.1	4.06
1945-50	29.5	3.74
1950-55	28.4	3.60
1955-60	26.6	3.64
1960-65	34.1	4.59
1965-70	30.6	4.13
1970-75	25.9	3.47
1975-80	17.2	2.18

needed to complete the life tables based on adjusted registered deaths after childhood.

Child Mortality

Using proportions dead among children ever born of mothers in standard five-year age groups, Brass (1964) has developed a procedure for estimating the probabilities of dying between birth and exact childhood ages. Trussell (U.N., 1983) has developed a modification of the original procedure that allows more flexibility in fertility and mortality patterns, while Coale and Trussell (1978) have proposed a procedure for dating the child mortality estimates to obtain period mortality risks under conditions of regular child mortality change over time. Trussell (U.N., 1983) has also developed a modification to be applied under conditions of fertility change, using parity ratios for true cohorts between two surveys as the basis for inferring the time pattern of births before the second survey. This latter modification has been applied to the 1979 data set, using in addition the average parities from the 1974 survey to allow for the sharp decline in fertility from the late 1960s.

Both Trussell modifications provide for the conversion of proportions dead into mortality risks using whichever of the four Coale-Demeny (1966) families of model life tables is regarded as best representing the true pattern of child mortality for the application at hand. It therefore requires the choice of the most suitable pattern. Registered child deaths are available by sex for 1949, close to the 1953 census, and for 1970, a census year. Child mortality rates have been calculated (after adjusting the deaths for estimates of registration completeness, as described in the next section) for ages 0, 1-4, and 5-9, and the implied mortality levels in each model family have been found. Results are shown in Table A.2.6 which also shows the average levels in each family implied by the mortality rates for age groups from 10 to 54 and their mean absolute deviations from the average levels. Based on the information shown, the West family appears best to represent Cuban mortality around 1950, whereas by 1970, the East family, with high infant relative to child mortality, appears most satisfactory. The East pattern has accordingly been selected for the analysis of child survivorship data for the 1970s.

Table A.2.7 shows the application of the Trussell procedure to the 1974 and 1979 child survivorship data and the application of the true cohort procedure to the 1979 data. The estimated probabilities of dying by exact ages of childhood have been converted into East mortality levels and infant mortality rates; this permits easy comparison both between surveys and with the official infant mortality rates for the period 1958-81. Figure A.2.1 displays the official sequence of rates by year against those implied by the child survivorship data, using the East family of model life tables. For the period up to the early 1970s, the indirect estimates indicate a sequence that is highly consistent both between surveys and with the official rates, although it must be remembered that the indirect procedure smooths out such short-term fluctuations as the infant mortality peaks in the early and late 1960s shown by the official figures. It is interesting to note that the true cohort version applied to the 1979 proportions dead using parity ratios for true cohorts from 1974 and 1979 to infer the time distribution of births provides a sequence of estimates virtually identical to that obtained from the standard version when applied to the 1979 data only. This indicates that the bias introduced by declining fertility is small in this case. From the early 1970s on, the consistency between the indirect and official rates disappears: the indirect estimates indicate constant or even rising child mortality, while the

TABLE A.2.6 Age-Specific Mortality Rates and Implied Coale-Demeny Mortality Levels in Childhood, Around 1950 and 1970: Cuba

		Implied Mortality Level by Family			
Age Group	Age-Specific Mortality Rate	North	South	East	West
1949/1953					
Males[a]					
0	.05720	19.4	22.1	20.8	19.7
1-4	.00618	19.7	19.9	18.2	18.5
5-9	.00142	21.4	18.9	19.0	19.6
Average, 10-54		19.8	17.4	18.5	19.1
Mean Absolute Deviation, 10-54		1.71	1.20	0.76	0.68
Females[b]					
0	.05106	18.9	22.1	20.3	19.1
1-4	.00667	19.1	19.6	17.7	17.9
5-9	.00139	20.6	18.4	18.6	19.0
Average, 10-54		17.7	15.4	16.2	17.7
Mean Absolute Deviation, 10-54		1.02	1.36	0.75	0.53
1970					
Males[c]					
0	.04406	20.7	23.4	21.7	20.9
1-4	.00127	23.1	23.9	22.2	22.4
5-9	.00046	23.8	22.5	22.5	23.0
Average, 10-54		23.1	21.1	22.2	22.1
Mean Absolute Deviation, 10-54		0.20	0.63	0.57	0.45
Females[c]					
0	.03505	20.7	23.8	21.7	20.7
1-4	.00130	22.6	23.8	21.8	21.8
5-9	.00040	22.9	22.1	21.9	22.2
Average, 10-54		22.4	20.5	21.2	21.8
Mean Absolute Deviation, 10-54		0.17	0.27	0.32	0.33

[a] Deaths inflated by factor of 1.20 throughout.
[b] Deaths inflated by factor of 1.30 throughout.
[c] Deaths inflated by factor of 1.01 throughout.

TABLE A.2.7 Application of Child Mortality Estimation Procedures to 1974 and 1979 Child Survivorship Data: Cuba

Age Group	Children Ever Born	Children Surviving	x	Probability of Dying by Age x q(x)	Reference Date	Implied East Mortality Level
1974						
15-19	82,734	80,408	1	0.0285	1973.3	22.6
20-24	373,823	360,707	2	0.0360	1971.9	22.1
25-29	711,423	686,620	3	0.0347	1970.0	22.3
30-34	969,324	926,787	5	0.0441	1967.6	21.7
35-39	955,723	911,754	10	0.0473	1965.1	21.7
40-44	918,016	867,590	15	0.0556	1962.2	21.3
45-49	863,453	803,364	20	0.0698	1959.0	20.8
1979						
15-19	84,250	81,362	1	0.0381	1978.6	21.7
20-24	346,551	334,170	2	0.0369	1977.1	22.0
25-29	637,376	614,700	3	0.0350	1974.9	22.3
30-34	893,525	859,861	5	0.0372	1972.2	22.2
35-39	1,022,016	974,820	10	0.0465	1969.2	21.7
40-44	942,024	890,685	15	0.0541	1966.0	21.4
45-49	899,933	843,814	20	0.0614	1962.8	21.2

1979 True Cohort Fertility Ratios

Age Group 1979	Proportion Dead	Parity Ratios $\frac{P(i-1, 1974)}{P(i, 1979)}$	x	q(x)	Reference Date	Implied East Mortality Level
20-24	0.03573	0.2225	2	0.0357	1976.8	22.1
25-29	0.03558	0.6007	3	0.0343	1974.5	22.3
30-34	0.03768	0.8317	5	0.0361	1971.5	22.3
35-39	0.04618	0.9460	10	0.0451	1968.4	21.8

official figures show a continued rapid decline. This discrepancy, the only major one between recent official statistics and results of indirect procedures discovered in this evaluation, deserves further investigation. It arises for two indirect estimates--those based on reports of women aged 15-19 and 20-24 in 1979; the estimate based on reports of women aged 25-29 is also somewhat above the official sequence, though this discrepancy is less than three points on the infant mortality rate. The results of the true cohort version indicate that the discrepancy

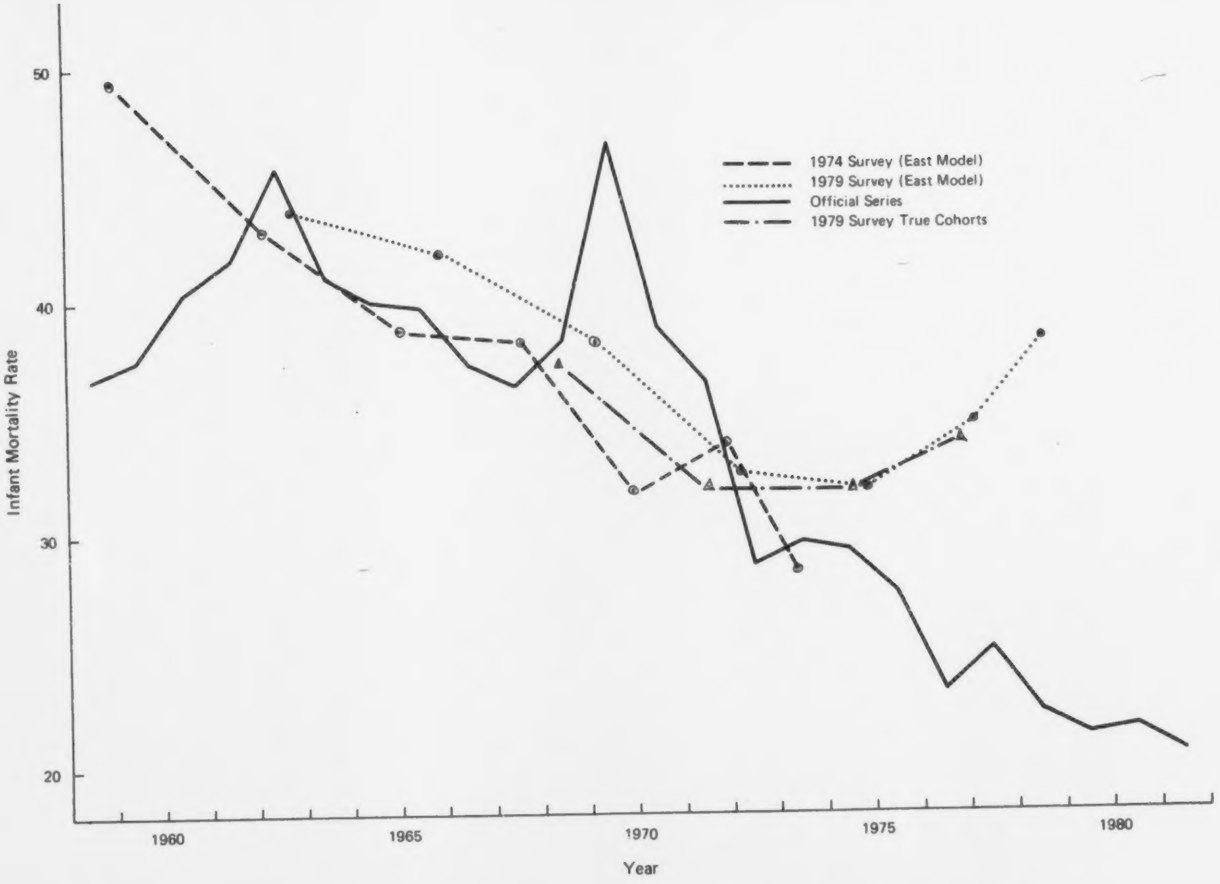


FIGURE A.2.1 Infant Mortality Rates from Vital Registration and Indirect Estimates from 1974 and 1979 Surveys: Cuba

does not arise from the effects of declining fertility on the indirect estimates; it is also clear from the dates obtained that it does not arise from the effects of declining mortality. The proportions of children reported as having died by women aged 15-19 and 20-24 in 1979 are therefore inconsistent with the official infant mortality rates for the late 1970s.

The official infant mortality rate represents an average rate for births to mothers of all ages. The indirect procedures assume that mortality risks of children do not vary with age of mother. However, applications frequently yield child mortality estimates based on reports of women aged 15-19, and to a lesser extent aged 20-24, that are markedly higher than the estimates based on reports of older women, that is, showing a pattern similar to the 1979 Cuban data. A plausible explanation for this pattern is that an above-average proportion of the children ever born of younger women are born to women from lower socioeconomic conditions: such women start their childbearing earlier, and since such children are typically exposed to above-average mortality risks, the proportion of children dead reflects not an average of mortality conditions for all children, but rather an average weighted toward children born into lower socioeconomic circumstances. The data from the 1979 survey on child survival by marital status show much higher proportions dead among children born to women in consensual than in legal unions, supporting the existence of mortality differentials by age of mother and socioeconomic status. Thus it is quite possible that the indirect child mortality estimates from 1979 based on the proportions dead among children ever born of women under 25 would be higher than the average mortality risks of children born between 1974 and 1979, without any overreporting of children dead. However, the size of the discrepancy between the indirect estimates and the official figures is too large to be explained entirely in such terms, and the lack of a similar pattern for the 1974 estimates is also puzzling. An additional, but unsubstantiated explanation, may be the inclusion or misreporting of abortions among nonsurviving children.

In summary, the sequence of official estimates of infant mortality from the late 1950s to the mid-1970s is strongly supported by the child survivorship data from 1974 and 1979. The sharp drop from the mid-1970s to 1980 is not supported by the available child survivorship data. However, in view of the evidence that birth and death registration was virtually complete in the late

1960s and early 1970s, and in the absence of evidence that registration has deteriorated, the official sequence is accepted, with the qualification that it is not independently supported and requires final confirmation from surveys in the early 1980s.

Estimates of child mortality for around 1953 have been obtained by adjusting child deaths for underregistration according to coverage estimates based on adult deaths. Results are shown in Table A.2.6. The indirect estimates from the 1974 survey reach back to the late 1950s. For this period, they suggest a mortality level about one higher (lower mortality) than the 1953 values. Although such an improvement is entirely plausible over a five-year period, the indirect estimates do not provide an immediate basis for evaluation of the 1953 values because of the time lag. Unfortunately, no other basis for evaluation exists since child mortality estimates have already been used to confirm the fertility estimates for the late 1940s using the 1953 census age distribution. Only the following conclusions can be drawn: that the child mortality estimates obtained by adjusting registered child deaths according to coverage estimates based on adult deaths provide internally consistent mortality rates using the West model family; that when these estimates are applied to the 1953 age distribution, they corroborate independently obtained fertility estimates; and that they give rise to plausible sex ratios at birth. Therefore, although their support is largely circumstantial, the estimates seem acceptable.

Mortality After Childhood

The only source of information on adult mortality is registered deaths by sex and age group. Such data are published for the period from the late 1950s to the early 1970s and also for 2 years in the late 1940s, though only for summary age groups above age 30. Brass, Preston, and Coale have developed a number of techniques for assessing the completeness of coverage of registered deaths by comparing the age distribution of deaths with that of the population on the basis of stable population relationships (see U.N., 1983 for a detailed description of these techniques). Two of these techniques--the Brass growth balance equation and the Preston-Coale procedure for comparing the observed population of each age group with the population estimated on the basis of age-group-specific registered deaths for that and subsequent age groups--have been applied using the 1953 and 1970 census age distributions and 1949 and 1970 registered deaths. The date discrepancy for 1949-53 is not important: as long as the age pattern of deaths would not have changed between 1949 and 1953, the estimates of completeness will be relative to the 1953 population and thus provide valid adjustment factors, though not valid estimates of completeness in 1949. The 1949 deaths for broad age groups were split up into deaths for five-year age groups using a model life table and the 1953 age distribution.

Because the Cuban population has clearly not been stable in recent decades, the assumption of stability for the application of these procedures requires examination. Fluctuations in fertility, such as those occurring between 1950 and 1970, will introduce irregularities but little overall bias; the fertility decline from the late 1960s will have no impact since it has no effect on the population over 5 by 1970; the presumed fertility decline before 1950 was probably fairly slow and thus will also have only a limited impact. Mortality decline has apparently been steady but not extremely fast, at least until the 1970s, and such declines do not have a large impact on the Preston-Coale procedure, though they tend to bias completeness estimates downward. Migration is a more serious problem; this is especially so for 1970 since emigration was at its highest during the 1960s. Migration that has no effect on the age distribution (equal migration rates at all ages) will have no effect on the method: neither the age distribution of deaths nor that of the population will be altered, though the absolute numbers of both will be changed. Since the Cuban emigration of the 1960s shows broadly similar numbers of male and female emigrants, the age distribution of the emigrants may have been fairly close to that of the overall population, though age-specific growth rates between 1953 and 1970 are low between the ages of 10 and 50, suggesting predominantly young and middle-age adult emigration. If the emigrants were preponderantly children and young adults, the age distribution of the remaining population will be older than that of the stable population, implying heavier mortality and thus leading to underestimates of death registration completeness. A modification of the original Preston-Coale procedure using age-specific growth rates in place of the assumed stability could have been used to remove the effects of fertility and mortality changes, except that the growth rates for age groups between 1953 and 1970 would still be affected by migration. The growth rates between 1953 and 1970 show consistent patterns by sex; rates are around 2.8 percent under age 10, drop to an average of around 1.5 percent between ages 10 and 50 and rise to very high average levels of around 4 percent over age 50. Major distortions introduced by migration should show up in the results of the Preston-Coale procedure in the form of either an implausible growth rate or a marked pattern in completeness estimates with age; in general, substantial emigration of typical age pattern is likely to result in underestimates of death registration completeness.

Table A.2.8 shows completeness estimates and growth rates for 1953 and 1970 for males and females using both the Brass and Preston-Coale procedures. For the Brass method, straight lines were fitted to the partial birth and death rates by a trimmed group mean approach, underweighting the first three and last three points. For the Preston-Coale approach, an open age interval of 55+ was used to reduce the effects of age exaggeration. The growth rate was found iteratively as the value giving the closest approximation to a horizontal series of completeness estimates by age, and the final completeness estimate was found as the average of the values over the age range 10 to 50. The completeness estimates by age obtained by

TABLE A.2.8 Estimates of Completeness of Death Registration by Sex, 1949-53 and 1970, from Brass and Preston-Coale Methods: Cuba

	Male		Female	
Method	Completeness	Growth Rate	Completeness	Growth Rate
1949 Deaths Relative to 1953 Enumeration				
Brass	0.809	.0220	0.922	.0298
Preston-Coale	0.831	.0225	0.770	.0270
1970 Deaths Relative to 1970 Enumeration				
Brass	0.874	.0203	0.854	.0239
Preston-Coale	0.987	.0215	0.857	.0238

the Preston-Coale procedure are plotted for each application in Figure A.2.2. From this figure, it will be seen that the 1970 applications yield a highly consistent series of completeness estimates for both males and females, though there is a substantial difference by sex in the overall completeness level--from virtual completeness for male deaths to only 86 percent completeness for female deaths. The Brass procedure gives consistent estimates of around 86 percent for both male and female completeness, but gives substantially different growth rates by sex. In view of oddities in the female age distribution and the greater effect of declining mortality on the Brass procedure, the Preston-Coale result for male deaths, implying a level of registration consistent with the 1970 census coverage, has been accepted for both sexes. For 1953, the male-female discrepancy is even more marked, particularly for the Brass approach, and the consistency of the Preston-Coale completeness estimates by age leaves much to be desired. Once again, in view of the apparent superiority of the male age distribution and the method's greater robustness to mortality change, the Preston-Coale estimate of registration completeness for male deaths of 83 percent has been accepted for 1953 for both males and females.

The completeness factors just selected were inverted to give adjustment factors. These factors were then used to adjust registered deaths for each age group, adjusted age-specific mortality rates calculated, and the implied mortality levels within each Coale-Demeny model family found. Results are shown in Table A.2.9. The mean mortality level for the age range 10 to 54 is also given, together with a measure of goodness of fit--the average absolute deviation of each observation in this age range from the mean. For 1953, it will be noticed that the West mortality pattern gives the best fit for both males and females. It may also be noted that the female mortality levels are lower than those for males, implying relatively heavier female mortality, even using the same adjustment factor for both sexes; the use of a larger adjustment factor for females, as would be supported by the Preston-Coale procedure, would give rise to an even larger imbalance. For 1970, the best fit to the adjusted age-specific mortality rates is provided by the North family for the age range 10 to 54, though all the models provide very good fits. In view of the good fits provided by the East family in childhood and the possible effect of age exaggeration on the rates, the East family

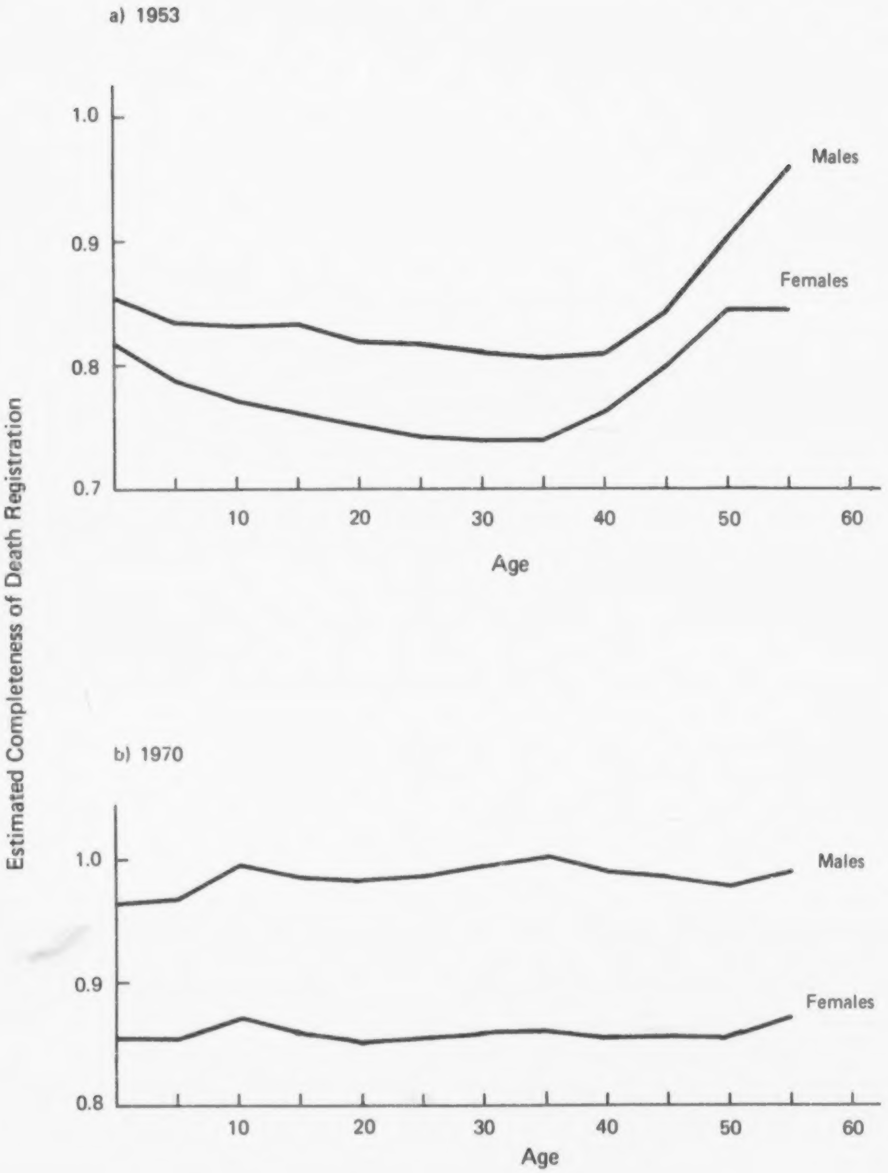


FIGURE A.2.2 Estimates of Death Registration Completeness N(a+)/N(a+) from Preston-Coale Method, 1949/53, 1970: Cuba

TABLE A.2.9 Age-Specific Mortality Rates from Adjusted Registered Deaths and Implied Coale-Demeny Mortality Levels: Cuba

Age Group	Age-Specific Mortality Rate	Coale-Demeny Mortality Level by Family North	South	East	West
a) 1949 Deaths (adjusted by 1.205) and 1953 Population					
Males					
5-9	.00142	21.36	18.90	19.00	19.57
10-14	.00097	21.37	19.20	19.39	20.09
15-19	.00166	21.81	18.48	19.80	20.11
20-24	.00288	20.84	17.78	18.60	19.01
25-29	.00298	20.79	17.63	18.44	19.08
30-34	.00321	20.83	18.31	18.62	19.36
35-39	.00361	20.79	18.51	19.28	19.88
40-44	.00704	17.45	15.46	16.40	17.63
45-49	.00890	17.34	15.82	17.52	18.32
50-54	.01283	16.91	15.57	18.06	18.41
55-59	.01710	16.81	16.70	20.04	19.74
60-64	.02317	18.02	18.40	21.61	21.32
65-69	.03581	17.87	18.41	21.72	21.50
70-74	.05639	17.79	19.30	22.16	21.65
75-79	.09000	17.55	20.63	22.41	21.61
Average Level, 10-49		19.79	17.42	18.46	19.10
Mean Absolute Deviation, 10-49		1.71	1.20	0.76	0.68
Females					
5-9	.00129	20.81	18.67	18.82	19.24
10-14	.00089	20.91	18.59	18.87	19.62
15-19	.00202	18.71	16.78	16.80	18.09
20-24	.00271	18.40	16.68	16.80	18.09
25-29	.00314	18.41	16.59	16.86	18.11
30-34	.00356	18.42	16.31	16.97	18.25
35-39	.00412	18.41	16.15	17.15	18.40
40-44	.00598	17.24	14.38	15.57	17.20
45-49	.00713	16.98	14.18	16.10	17.74
50-54	.01005	16.52	13.92	16.08	17.71
55-59	.01357	16.51	14.46	17.20	18.26
60-64	.01691	18.89	17.58	20.04	20.70
65-69	.02754	18.88	17.97	20.58	20.84
70-74	.04541	18.87	19.09	21.43	21.21
75-79	.07415	18.84	20.39	22.29	21.73
Average Level, 10-49		18.43	16.21	16.89	18.19
Mean Absolute Deviation, 10-49		0.69	0.98	0.58	0.43

TABLE A.2.9 (continued)

Age Group	Age-Specific Mortality Rate	Coale-Demeny Mortality Level by Family North	South	East	West
b) 1970 Deaths (adjusted by 1.011) and 1970 Population					
Males					
5-9	.00046	23.83	22.47	22.44	22.95
10-14	.00054	23.06	21.68	21.95	22.12
15-19	.00127	22.82	19.71	21.17	21.30
20-24	.00151	23.45	20.48	21.96	21.88
25-29	.00160	23.32	20.55	21.83	21.74
30-34	.00176	23.37	21.19	21.82	21.82
35-39	.00224	23.00	20.98	21.79	21.87
40-44	.00289	22.97	21.60	22.32	22.35
45-49	.00418	22.75	21.87	22.98	22.86
50-54	.00645	23.04	22.21	23.80	23.20
55-59	.00993	22.33	22.35	25.00	23.78
60-64	.01632	22.18	21.92	25.00	23.83
65-69	.02580	22.31	21.95	25.00	25.00
70-74	.04946	19.83	20.95	23.57	23.16
75-79	.06625	22.70	25.00	25.00	25.00
Average Level, 10-54		23.08	21.14	22.18	22.13
Mean Absolute Deviation, 10-54		0.20	0.63	0.57	0.45
Females					
5-9	.00040	22.93	22.08	21.91	22.22
10-14	.00045	22.55	21.01	21.01	21.53
15-19	.00086	22.14	20.11	20.49	21.02
20-24	.00105	22.58	20.61	20.85	21.47
25-29	.00121	22.64	20.70	20.94	21.62
30-34	.00142	22.47	20.75	21.13	21.74
35-39	.00178	22.29	20.59	21.36	21.90
40-44	.00247	22.53	20.49	21.38	21.99
45-49	.00337	22.37	20.36	21.88	22.50
50-54	.00554	22.06	19.77	21.51	22.21
55-59	.00756	22.10	20.20	22.16	22.86
60-64	.01227	22.12	20.37	22.35	22.88
65-69	.01983	22.51	20.92	22.98	23.40
70-74	.03452	22.46	21.63	23.56	23.64
75-79	.05046	23.95	23.88	25.00	25.00
Average Level, 10-54		22.40	20.49	21.17	21.78
Mean Absolute Deviation, 10-54		0.17	0.27	0.32	0.33

was selected as an adequate representation of Cuban mortality in 1970 at all ages. It may be noticed that the male-female differential in mortality level is still about one level for the East family, though smaller for the other families. The infant mortality rate for both sexes implied by a 22.2 East level for males and a 21.2 East level for females is 38, in satisfactory agreement with the estimates given in Figure A.2.1.

MIGRATION

The official figures on Cuban migration are widely believed to understate the true flows out of the country since the revolution. Unfortunately, the possibilities for evaluating migration data are more limited than those for evaluating fertility and mortality data. There are two main checks: arrivals of Cuban nationals, or de facto residents of Cuban origin, in other countries, notably the U.S. as the major recipient; and changes in the de facto Cuban population over time. Although these checks are not in general highly reliable, they may be expected to reveal any major problems with the official figures.

A comparison of the number of Cubans recorded as arriving in the United States (Table 29) and the official Cuban net migration totals for the period 1959-79 shows a remarkable degree of consistency. Table A.2.10 gives the numbers from the two sources for approximately the same five-year periods. U.S. arrivals exceed net Cuban emigration for all periods except the early 1970s; this

TABLE A.2.10 Comparison of Cuban Arrivals in the U.S. and Net Emigrants from Cuba by Five-Year Periods, 1960-79

Period	Cuban Arrivals in U.S.	Net Cuban Emigrants
1960-1964	247,341	208,535
1965-1969	223,852	211,422
1970-1974	149,772	156,799
1975-1979	24,303	20,294

would be expected unless illegal immigration to the U.S. were substantial, since no allowance is made for return or onward migration. Although the data are not adequate to establish exactly what was going on, the figures in Table A.2.10 clearly show that the official Cuban emigration data are of the right order of magnitude.

A further comparison is available with U.S. 1970 census data on the Cuban-born population by age and date of arrival. Those who arrived between 1965 and 1969, classified by age and sex, can be adjusted for mortality on the assumption that the arrivals were evenly spread over the period; this will permit an estimate of the number of Cuban arrivals, net of return or onward migrants. Table A.2.11 compares the resulting numbers with the official figures on net emigrants; a rough age breakdown has also been introduced, obtained for the Cuban statistics by assuming that the age pattern of migrants in years for which no age breakdown is available was the same as that in years for which figures are available. Agreement is again satisfactory: the 1970 U.S. census suggests the net arrival of some 204,000 Cubans between 1965 and 1969, while the Cuban data show a net emigration of about 230,000 over the same period. The two figures should not be expected to agree exactly: some emigrants will have gone to destinations other than the U.S.; moreover, the Cuban figures cover all countries of origin and destination, while the U.S. figures cover only net gains of those of Cuban origin. If the U.S.

TABLE A.2.11 Comparison of the Cuban-Born Population of the U.S. in 1970 with Arrival Dates Between 1965 and 1969 (adjusted for mortality) with Net Cuban Emigrants for the Period, by Sex and Broad Age Groups

	Male		Female	
Age Group	Net Emigrants	U.S. Cuban-Born	Net Emigrants	U.S. Cuban-Born
0-14	35,928	29,332	33,625	29,284
15-59	63,514	52,830	70,025	69,170
60+	12,345	8,898	14,478	14,736
Total	111,787	91,060	118,128	113,190

figures were substantially larger than the Cuban figures, it would be reasonable to assume that the Cuban figures were underestimates. As it is, with a difference of only some 12 percent between the figures and reasonable agreement by age, the U.S. data again confirm the order of magnitude of the Cuban figures and provide no grounds for rejecting or revising their levels.

The third procedure for evaluating the migration figures is to incorporate them into population projections and see how well the observed population structures can be replicated using estimated fertility, mortality, and migration rates. However, since this procedure provides a simultaneous check on all three elements of population change, it is discussed in the next section.

POPULATION SIZE AND AGE STRUCTURE

If the fertility, mortality, and migration estimates available for Cuba are correct, it should be possible to obtain the population size and age structure for one period from any other period by projection. The Cuban population by age group and sex is available for the census years of 1953 and 1970; provisional results for rather unusual age groups are available from the 1981 census; and a population total is available for 1943. The 1953 population has been projected backward to 1938 and forward to 1983, while the 1970 population has been projected backward to 1940 and forward to 1985. The assumptions underlying these projections, as regards total fertility, Coale-Demeny model life table levels, and net migrants by sex for each period are shown in Table A.2.12. Age patterns of fertility were adopted from Tables 3 and 8, while the age pattern of migrants was based on that of Cuban nationals resident in the U.S. in 1970 who had arrived during the 5 previous years, adjusted for mortality.

Table A.2.13 shows the ratio of the age and sex composition of the projected populations based on the 1953 and 1970 censuses to that of the enumerated populations in 1953 and 1970. For 1970 and 1981, the projected and enumerated populations agree closely, at least in totals, the 1970 projection being about 2 percent smaller than the enumerated population. The age structures, however, show some interesting patterns. The projection has a large excess in the age group 10-14 and a large deficit in age groups 15-19 and 20-24; age

TABLE A.2.12 Assumptions of Population Projections from 1953 and 1970 Bases: Cuba

		Coale-Demeny Mortality Parameters					
		Male		Female		Net Migrants	
Period	Total Fertility	Level	Family	Level	Family	Male	Female
1953 Base							
1938-43	4.22[a]	17.8	West	16.8	West	-25,000	-25,000
1943-48	3.95[a]	18.3	West	17.3	West	-25,000	-25,000
1948-53	3.60[a]	18.8	West	17.8	West	-10,000	-11,920
1953-58	3.60	b	b	b	b	--	--
1958-63	4.50	b	b	b	b	-64,308	-107,358
1963-68	4.35	21.7	East	20.7	East	-79,432	-91,599
1968-73	3.85	22.4	East	21.4	East	-105,439	-99,288
1973-78	2.53	23.2	East	22.2	East	-9,328	-2,999
1978-83	1.80	24.0	East	23.0	East	-65,000	-65,000
1970 Base							
1940-45	4.02[a]	18.0	West	17.0	West	-25,000	-25,000
1945-50	4.01[a]	18.5	West	17.5	West	-19,000	-19,000
1950-55	3.89[a]	19.0	West	18.0	West	-6,000	-6,000
1955-60	3.64[a]	b	b	b	b	2,000	2,000
1960-65	4.59[a]	b	b	b	b	-84,400	-115,703
1965-70	4.12[a]	21.8	East	20.8	East	-115,307	-133,829
1970-75	3.47	22.6	East	21.6	East	-63,003	-43,941
1975-80	2.18	23.4	East	22.4	East	-35,000	-35,000
1980-85	1.70	24.0	East	23.0	East	-42,500	-42,500

[a] Level defined by reverse-projected population
[b] Interpolation between adjacent life tables

misreporting in 1970 is the likely culprit, rather than misspecification of fertility or mortality in the 1950s. Above age 45, the projected population is too small, particularly for males. This deficit probably arises from two sources: an exaggeration of age in 1953, exposing the population to higher mortality risks in the projection than their true risks, and a further exaggeration of age in 1970, particularly for males. The pattern of the discrepancies in 1970 between the projected and enumerated populations strongly suggests that the discrepancies arise largely from age misreporting; the discrepancy in the total may arise partly from age exaggeration in 1953 and partly from a slight underenumeration in 1953 relative to 1970 on the order of 1 or 2 percent.

TABLE A.2.13 Ratios of Projected to Observed Populations, by Sex and Age Groups, 1953, 1970, 1981: Cuba

	1953		1970	
	Reverse-Projected from 1970: Observed		Projected from 1953: Observed	
Age Group	Male	Female	Male	Female
0-4	1.082	1.112	1.012	1.007
5-9	1.011	1.045	1.000	0.994
10-14	0.962	0.991	1.122	1.119
15-19	1.067	0.974	0.914	0.891
20-24	0.946	0.975	0.958	0.927
25-29	1.049	0.991	1.037	0.996
30-44	1.057	1.008	0.998	1.028
45-74	1.377	1.393	0.917	0.966
75+	0.978	1.050	0.605	0.571
Total	1.091	1.076	0.980	0.984

	1981	1981
Age Group	Projected from 1953: Observed,[a] Both Sexes	Projected from 1970: Observed,[a] Both Sexes
0-16	0.998	1.034
17-29	1.049	1.000
30-44	1.015	1.041
45+	0.965	0.977
Total	1.005	1.014

[a] Provisional figures.

A comparison between the 1953 enumerated population and the reverse-projected 1970 age distribution is less satisfactory. Overall, the reverse-projected population is some 8 percent larger than the observed population, though almost all of this excess is accounted for by large discrepancies in the age group 45-74 (almost 40 percent larger in the projected than in the enumerated population) and for the age group 0-4 (almost 10 percent larger in the projected population). For the age group 5-44, the reverse-projected male population is 2 percent larger than that observed, while the female populations differ by less than half a percent. The reverse-projected age group 5-44 is based on persons aged 22 to 61 in 1970; it depends only on their age structure in 1970, and the mortality and migration assumptions made in the projection, with migration being the main factor in this case. The reasonable agreement for the age range 5-44 thus supports the general level of the migration figures used. The very large excess of projected population aged 45-74 in 1953 probably arises from age exaggeration above ages 55 or 60 in 1970, a feature clearly visible in the death distribution applications presented above. The other possible explanation would be that the mortality assumed at older ages for the reverse projection was too high, though this explanation is not supported by the mortality evidence already discussed. The second large discrepancy is at ages 0-4, where the projected population based on respondents aged 17-22 in 1970 is 10 percent larger than the enumerated population; this excess is the manifestation in 1953 of the apparent exaggeration of age of teenagers in 1970. It is possible that the cohort aged 15-24 in 1970 really was large because of a birth boom between 1945 and 1955, seen neither in the official statistics for fertility nor in the 1953 age distribution; however, this must be regarded as unlikely, especially given the more normal size of the cohort aged 30-44 in 1981. The major discrepancies between the projected and enumerated 1953 populations seem more likely to arise from age misreporting in 1970 than from failure to specify reasonable mortality and migration assumptions.

The only age information from the 1981 census is provisional totals for both sexes combined and unusual age groups. Both the 1953- and 1970-based projections can be compared with the 1981 results, though a word of caution is required because of the massive short-term emigration from Cuba in 1980; standard five-year projection routines cannot handle such events satisfactorily. The effect of the emigration on the projected populations for 1981 will be underestimated, tending to make the projected numbers somewhat too large. In fact, the agreement is remarkably close overall and at all age groups except 45 and over; for this latter age group, the observed population is larger than the projections, a discrepancy that may well arise from a continuation at a reduced level of some age exaggeration in 1981.

CONCLUSIONS

The evaluations described in this Appendix show Cuban demographic data to be of very high quality. Even the migration data, the Achilles' heel of almost all demographic data systems, fit well into the overall picture, though the details of the migration assumptions and even the net numbers could be changed substantially without greatly affecting the overall consistency. One or two elements of the official series need revision: it seems likely that fertility had fallen to its 1950s low point virtually by the start of the decade; the 1970 age distribution is characterized by certain age exaggeration problems, particularly over 60 and from the age group 10-14 to the next two higher groups; and the rapid post-1970 decline in child mortality cannot be substantiated fully, though on the grounds of statistical continuity, the decline should be accepted as probably correct.

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CELADE: Centro Latinoamericano de Demografia
D.C.E: Direccion Central de Estadisticas
IPPF: International Planned Parenthood Federation
JUCEPLAN: Junta Central de Planificacion
UNFPA: United Nations Fund for Population Activities
WHO: World Health Organization

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5.17

COMMITTEE ON
POPULATION AND DEMOGRAPHY

Report No. 27

Rapid Population Change in China, 1952-1982

Ansley J. Coale

Committee on Population and
Demography
Commission on Behavioral and
Social Sciences and Education
National Research Council

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PREFACE

This report, using analyses of recently available census and survey data on the population of China, presents the demographic history of China during the past 30 years. The report uses detailed assessments of data from a major 1982 fertility survey and the 1982 census of China, which became available at the end of 1983, to develop estimates of three major population processes for 1952-82: fertility, nuptiality, and mortality.

With the rapid expansion in world population in recent decades, fertility and its determinants have been urgent topics for research. Attempts to affect population growth have focused on reducing fertility, with some apparent effect. The peak rate of growth in the world's population has now passed although growth is still at a high level in almost all the developing countries. In absolute numbers, the increase in the world's population continues to rise: according to United Nations medium projections, more people will be added each year for the next 35-40 years than were added in 1980. In this context, China's recent rapid declines in fertility and mortality are remarkable; moreover, China's decline in fertility has contributed substantially to the modest reduction in the world rate of population growth.

This report on China is number 27 in a series of reports prepared by the Committee on Population and Demography and its several panels. (A complete list of these reports is printed on the inside back cover.) The committee was established in 1977 by the Commission on Behavioral and Social Sciences and Education of the National Research Council (NRC). Funded for a period of 5-1/2 years by the Agency for International Development (AID), the committee undertook three major tasks:

1. To evaluate available evidence and prepare estimates of levels and trends of fertility and mortality in selected developing nations;

2. To improve the technologies for estimating fertility and mortality when only incomplete or inadequate data exist (including techniques of data collection); and

3. To evaluate the factors determining the changes in birth rates in less developed nations.

About half of the reports resulting from these tasks are concerned with demographic estimates in less-developed countries and with methodology and the other half are concerned with the determinants of fertility.

In its early deliberations about which countries to include in its work, the committee did not select China for several reasons, primarily the nonavailability of an adequate data base for a scientific assessment of fertility and mortality trends. At that time, it was not foreseen that it would be possible later on to prepare a comprehensive report on the demography of China. However, the committee was interested in China, and, with cosponsorship by the NRC's Committee on Scholarly Communication with the People's Republic of China and modest support from the U.S. Department of State, a workshop on population research in China was held at the National Academy of Sciences in October 1980; the proceedings were published by the National Academy Press in 1981.

This report on China has been made possible by a grant from The Rockefeller Foundation and with support from the NRC Fund.*

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*The National Research Council (NRC) Fund is a pool of private, discretionary, non-federal funds that is used to support a program of Academy-initiated studies of national issues in which science and technology figure significantly. The NRC Fund consists of contributions from: a consortium of private foundations including the Carnegie Corporation of New York, the Charles E. Culpeper Foundation, the William and Flora Hewlett Foundation, the John D. and Catherine T. MacArthur Foundation, the Andrew W. Mellon Foundation, the Rockefeller Foundation, and the Alfred P. Sloan Foundation; the Academy Industry Program, The committee and the National Research Council wish to thank Ansley J. Coale for preparing this report, and indeed for doing so within such a short period of time. Sincere thanks are also extended to the reviewers who both read the report on short notice and attended a review meeting in Washington in April 1984. Several other individuals assisted in the production of this report. Marleen Stern and Kathryn Reynolds typed the draft and tables in Princeton, and Barbara Vaughan assisted with computer tabulations. At the NRC, Lucy Santiago typed the camera-ready copy of text and tables, Eugenia Grohman edited the report, and Elaine McGarraugh handled all of the production editing details. The committee extends its gratitude to these individuals for their contributions to the report.

Finally, this is a fitting occasion to thank Ansley J. Coale for his leadership of the Committee on Population and Demography and his many contributions to its products. The committee's extensive accomplishments owe much to those contributions and especially to his effectiveness as committee chair.

Robert J. Lapham, Study Director
Committee on Population and Demography

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which seeks annual contributions from companies that are concerned with the health of U.S. science and technology and with public policy issues with technological content; and the National Academy of Sciences and the National Academy of Engineering endowments.

SUMMARY

In 1982 the People's Republic of China carried out a census with a more comprehensive interview schedule than ever before employed in China and using a very large, carefully chosen, and extensively trained field staff. The census was preceded by pilot surveys to test the instruments and field procedures. A tabulation of 10 percent of the individual returns has been completed, published in China, and made available abroad in limited circulation. Also in 1982 a fertility survey covering a very large sample of households (total population of more than 1 million) was conducted in China, and its results have been published in great detail in a special issue of the Chinese Journal Population and Economics. In addition, the distribution of the population by sex and single years of age as enumerated in the censuses of 1953 and 1964 has been recently released. This new information, supplemented by time series of registered births and deaths and end-of-year population totals extending back to the 1950s and by data from other large recent surveys, provides a sound basis for constructing an accurate and detailed history of the remarkable changes in fertility, mortality, and marriage that have occurred in China since the People's Republic was established.

The newly available information includes complete histories of marriage and childbearing of women up to age 67 in the 1/1,000 fertility survey of 1982. The responses have been analyzed and tabulated in the form of marriage rates and birth rates by single years of age in single calendar years from 1950 to 1981. When the survey data are combined and compared with the census data for 1953, 1964, and 1982 on numbers of persons by sex and single years of age, they pass a series of stringent tests of accuracy and consistency. The same analysis

reveals that official data on birth and death rates have understated the true numbers by a considerable margin. The tests support the substantive findings in this report on levels and changes in fertility, nuptiality, and mortality in China since 1950.

Fertility Rates. The birth rate in China has been higher than that listed in official sources. In the 1950s the birth rate was generally above 40 per 1,000 until a precipitous fall--from 42.5 per 1,000 in 1957 to 21.9 in 1961--that coincided with the Great Leap Forward and the ensuing years of economic disruption and famine. The post-crisis peak birth rate in 1963 was just short of 50 births per 1,000.

A more useful fertility measure, the total fertility rate (TFR)--the average number of children that would be born in a lifetime to women subject to the birth rates by age in a given period--was about 6.0 before the Great Leap Forward, declined to 3.3 in 1961, rose to 7.5 in 1963, returned to 6.0 in the mid-1960s, fell steeply to only 2.2 in 1980, and then rose slightly to over 2.6 in 1981 and 1982. The birth data on which these fertility rates are based are derived from the new detailed information, especially that from the fertility survey. It is clear that the number of births previously listed in official sources has been incomplete: by more than 15 percent in the 1950s, by less than 10 percent in the late 1960s and early 1970s, and by 15 percent or more since the intensification of the antinatalist program in 1979.

Age Pattern of Fertility. The age pattern of fertility of married women in the 1950s was a pattern of gradual decline in the rate of childbearing with age until age 30; the decline steepened after age 30 and especially after age 35. This age pattern closely resembles the early gradual and later steep decline of marital fertility rates with age of woman that is characteristic of populations in which couples practice little contraception or induced abortion. This age pattern of marital fertility in the 1950s supports the inference of little use of contraception. In the 1970s (and especially in 1980), by contrast, marital fertility rates fell very steeply with age of women after their late 20s, a pattern characteristic of very general resort to contraception to limit fertility after desired family size is reached.

In 1961, when the TFR fell to only a little more than half the TFR of 1955 or 1957, the fertility of married women was very much reduced at all ages. A nearly uniform reduction in fertility at different ages is consistent with a quasi-biological cause of low fertility--i.e., low fertility was the result of disruption of normal life and famine-induced subfecundity rather than a large increase in the use of contraception. The unmatched post-crisis TFR of 7.5 in 1963 involved peak marital fertility rates at all ages. These high rates at all ages may also have a quasi-biological explanation. Newly married couples (there was a very high first-marriage rate in 1962) and couples resuming normal life are especially susceptible to the risk of childbearing since few of the women are protected from the risk of pregnancy because of nursing a previously born child.

Contraceptive Use. In 1981 contraception--mostly sterilization, the IUD, and contraceptive pills--was practiced by more than two-thirds of married women aged 15 to 49.

Mean Age at First Marriage. The mean age at first marriage of women was about 18.5 years in the 1940s, about a year older than that estimated for rural China in 1930. The mean age at marriage rose gradually (with some fluctuations) to a little more than 20 in 1970, and then steeply to more than 23 in 1979. There was then a slight decline, of about four- tenths a year, to a mean age of 22.7 years in the first half of 1982.

Effects on Fertility of Changes in Mean Age at First Marriage. The changing age of entry into marriage contributed strongly to changes in fertility. Had the noncontraceptive marital fertility rates at each age of the 1950s continued, the increase in age at marriage by itself, by exempting many younger women from the risk of childbearing, would have led to a TFR in 1980 that was 20 percent below the TFR of 1950--a hypothetical decline about one-third as great as the actual one. The rise in age at marriage in the 1970s would have produced (by a different mechanism) a 20 percent reduction in the TFR during that decade even if from 1970 on married women had successfully attained unchanging goals of restricted family size. This apparently anomalous effect--a 20 percent decline in TFR even though married women produce an unchanging total number of children per marriage--arises from the temporary reduction in the number of marriages that is caused by a rise in mean age at marriage. About one-third of the reduction in the TFR from 1970 to 1980 was associated with the increase in age at marriage and would have occurred with constant duration-specific marital fertility rates.

When mean age at marriage ceases to rise, the diminution in the number of marriages caused by rising age at marriage ceases, and the number of the newly married women increases. In 1980-82 a sharp increase in the total first-marriage rate accompanied the termination and slight reversal of the increase in mean age at marriage. Most of the upturn in TFR after 1980 was the result of the marriage boom in 1980-82 and would have occurred with constant fertility rates at each duration of marriage. Upward pressure on the TFR will continue because the highest marital fertility rates occur one or two years after the date of marriage; the large number of marriages in 1981 and 1982 will inflate births in 1983 and 1984 even if the recently married have only one or two children.

Urban/Rural and Other Fertility Differences. Before the temporary sharp decline in the TFR that began in 1958, the TFR in the cities was about 10 percent below the rural TFR; about half of the difference in fertility can be ascribed to later marriage in the urban population. As shown in Figure 1, between 1960 and 1966, the urban TFR fell to about half the rural TFR, and it remained at about that fraction when the large reduction in rural fertility began in 1970. Other differentials in fertility that are usually present in the first years of a major reduction were present in China in 1981: fertility was lower for more educated women and for women in higher occupational categories; the minority ethnic groups had much higher fertility than the rural Han majority.

Future Trends in Fertility. Further upward pressure on the birth rate in the late 1980s is built into the age distribution of the Chinese population, shown in Figure 2. Women in their early 20s in 1982 were born in 1958-61, a period of greatly reduced birth cohorts. In the next few years the very large birth cohorts of 1963-70 will be in the normal ages of first marriage and thereafter in the very fertile years soon after marriage.

Male/Female Birth Ratios. The large-scale fertility survey recorded ratios of male to female births that were very close to the worldwide normal ratio of about 106

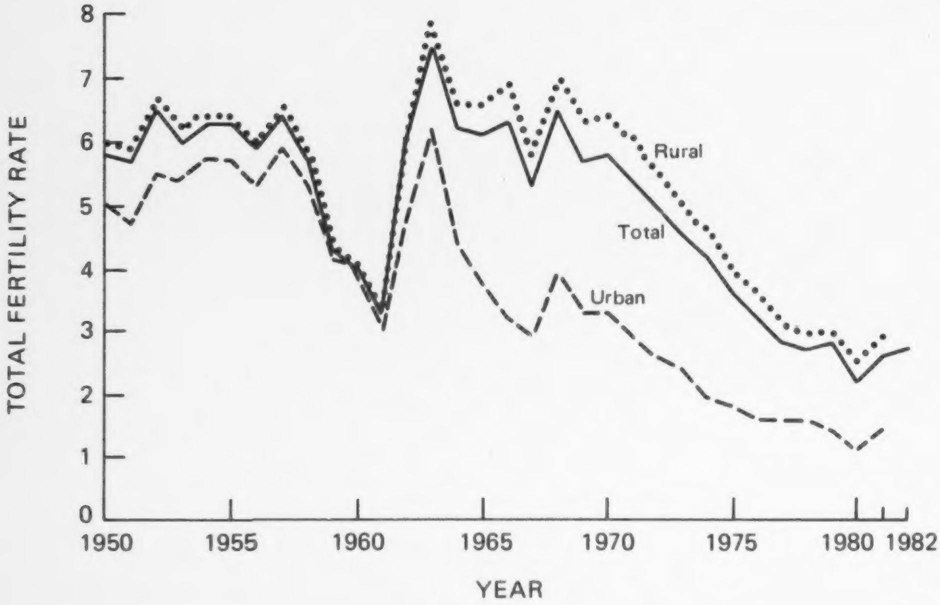


FIGURE 1 Total Fertility Rates for Urban and Rural Areas and for China, 1952-82: China

males per 100 females among first and second births in the rural population, but there were more than 112 males per 100 females for third- and higher-order births. The male/female ratio for urban births was somewhat higher (over 108) for first births, and much higher (about 118) among the small number (257) of births beyond the first. Experience in other populations is of slightly declining male/female ratios with birth order. Since stopping rules--no more births following a male--do not affect the male/female ratio and sex-selective abortion on a large scale does not seem possible in rural China, the explanation for the reported male/female birth ratios must be unreported higher-order female births. There may be a connection between failure to report a higher-order female birth in the survey and the occurrence of female infanticide, which has been widely reported (and deplored) in the Chinese press. Given the penalties imposed in the one-child campaign and the cultural preference for male births, higher-order female births are doubtless especially unwelcome.

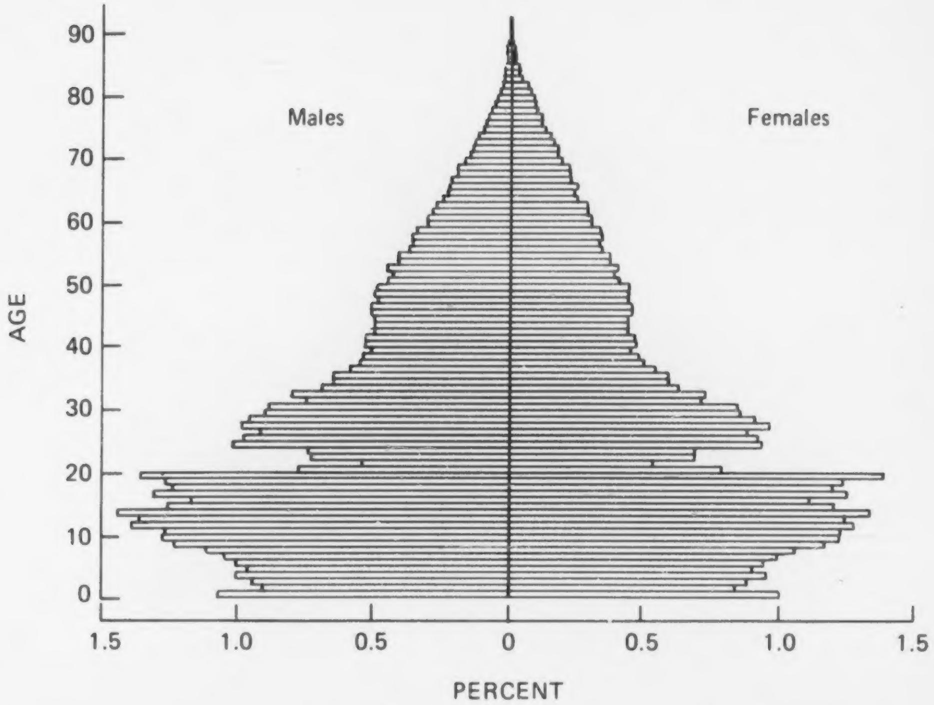


FIGURE 2 Age Pyramid of the Population, 1982: China

Source: China, Population Census Office (1983:Table 19).

Life Expectancy. Average death rates by age for each sex in each intercensal interval can be calculated from census data and constructed numbers of births. From these death rates life tables are derived that show the average age at death that would result from the continued prevalence of the calculated intercensal average death rates. The expectation of life at birth increased from 42 for males and 46 for females in 1953-64 to 62 for males and 63 for females in 1964-68. This increase in less than two decades replicates the increase typical of six West European populations from 1870 to 1940. A life table was recently calculated for 1981 from deaths reported in the 1982 census. It shows a further increase in expectation of life at birth to 66 years for males and 69 for females.

Mortality Rates. Official figures on the annual number of deaths understate the true number by a greater proportion than the proportionate understatement of the number of births. It is possible to determine only the

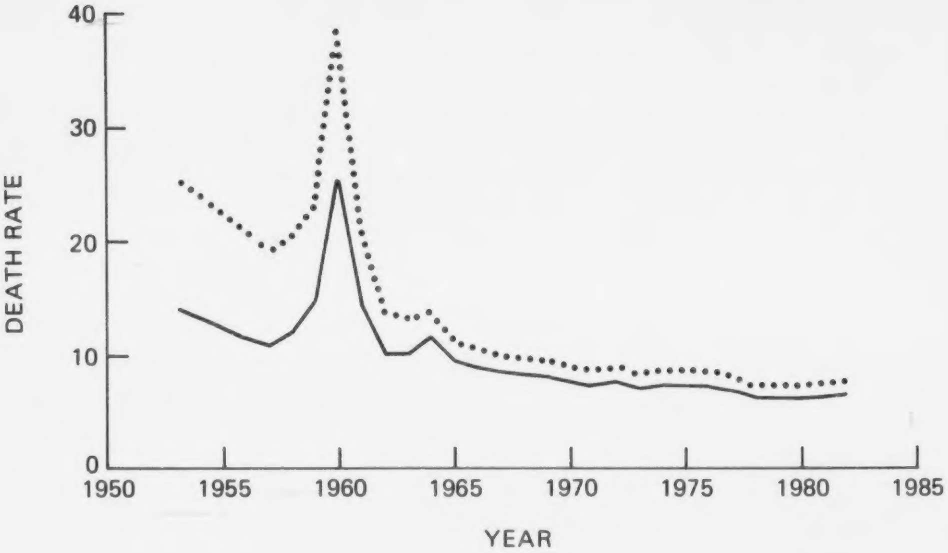


FIGURE 3 Death Rates (per 1,000) from Recorded Deaths (solid line) and Adjusted for Underreporting (dotted line), 1953-82: China

understatement of the total number of deaths for intercensal periods: about 38 percent of the deaths in 1953-64 were not recorded and about 16 percent of the deaths in 1964-82.

According to official sources, annual death rates (Figure 3) were about 15 per 1,000 in the early 1950s and declined to about 11 per 1,000 in 1957. There was an increase in death rates during the years of the Great Leap Forward and the ensuing crisis, with an officially listed peak rate of 25 per 1,000 in 1960. The death rate fell to 10 in 1963 as normal conditions were restored, then continued to decline to a rate between 6 and 7 per 1,000 in the late 1970s and early 1980s. When the intercensal aggregate shortfall in the number of deaths derived from official sources is allocated under an assumption of improving completeness after 1955 and constant completeness from 1964-82, the estimated death rate in the early 1950s is above 20, the peak death rate in 1960 is above 35, and the recent death rate is between 7 and 8 (rather than between 6 and 7). Excess deaths (those above a linear trend) from 1958-63 are about 16 million when based on the understated official figures and about 27 million when adjusted for understatement.

CHAPTER 1

INTRODUCTION

SCOPE OF THE REPORT

This report is a summary of fertility, nuptiality, and mortality in the People's Republic of China from the early 1950s to 1982. It is based largely on the single-year age distributions tabulated in the censuses of 1953, 1964, and 1982 (with some adjustment) and the detailed history of fertility and nuptiality collected in the large-scale 1982 survey of retrospective experience among 311,000 women aged 15-67. The survey was conducted by the State Family Planning Commission.

Much of the data presented here are taken from a special issue of the Chinese journal Population and Economics, published in 1983, which was devoted to detailed information about the fertility survey and its results. Some of the important features of the demography of China summarized in this report--such as the sequence of total fertility rates for each year since 1950--are simply reproduced from Chinese sources (in particular the special issue of Population and Economics). Other features, such as birth rates, completeness of official data on annual births and deaths, marital fertility rates by age and by duration of marriage, and intercensal life tables, were calculated for this report. The methods of calculation range from simple cumulation of fertility rates to newly invented methods of life-table construction from census data.

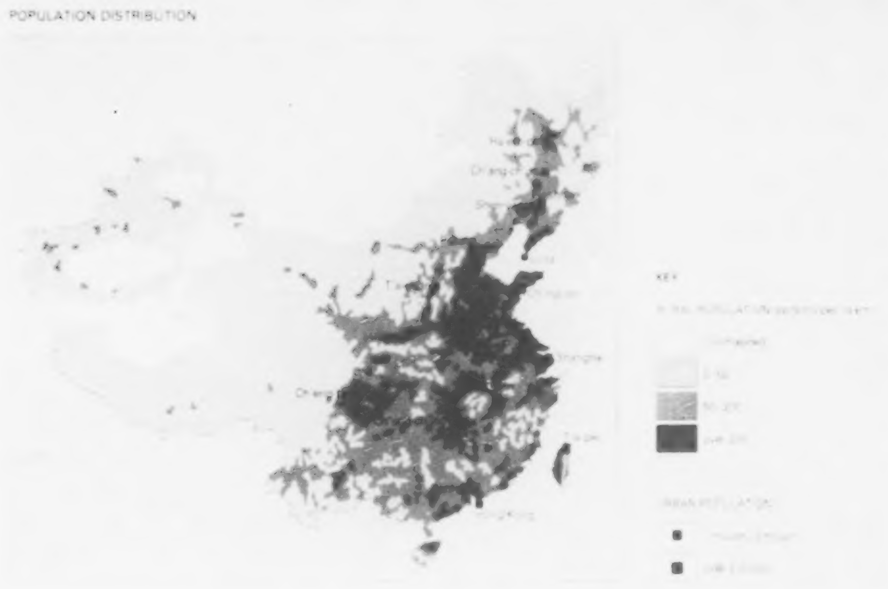
The report is intended as a summary of population trends and not as an account of their causes. It presents some treatment of what demographers call the proximate determinants of fertility, including an analysis of the influence of changes in nuptiality on fertility and inferences from the age structure of marital fertility about the probable absence or prevalence of contraceptive practice. It also comments on the most conspicuous features in the evolution of the population: the deficit of births and the excess of deaths in 1958-61 and the steep decline in fertility after 1970. However, the aim of the report remains demographic, to describe and analyze the population patterns in China.

BACKGROUND

With a population of just over 1 billion, China is the most populous country in the world. Its population is one-third larger than the second most populous country, India (with about 725 million in 1984). In area, however, China ranks only third; with 3.69 million square miles, it has almost exactly the same area as the United States, with 3.62 million square miles. China is geographically similar to the United States in other ways, too: its territory extends 3,100 miles from east to west, although its north-south distance of 3,500 miles is much greater than that of the United States. China also has extensive mountainous terrain and arid and semi-arid areas. In addition, the population of China, like that of the United States, is concentrated in the eastern part of the country (see map).

Located in East Asia, China has very long boundaries (17,445 miles), which include long borders with the Soviet Union and the Mongolian People's Republic to the north and northwest, borders with India, Pakistan, and Afghanistan for the most part to the west, and with the Socialist Republic of Vietnam to the south. A cross-section of the country would show a land mass lying at low altitudes in the east, rising to plateaus, and on to the mountains in the west, including the world's tallest, Mt. Everest at 28,911 feet. China's main lowlands, which include the Manchurian Plain, the North China Plain, the Middle and Lower Yangtse River, and the Southeastern Hills, cover about 386,000 square miles (Kaplan et al., 1980). These plains in the eastern and southeastern parts of the country contain large parts of the Chinese population. Through these plains flow some of China's major rivers, including Asia's longest, the 4,000-mile Yangtse, in central China and the 3,000-mile Yellow River in the north.

Despite a substantial expansion of China's urban population during the early twentieth century, the



Source: Hook (1982:40).

country is still primarily rural; some four-fifths of the Chinese population reside in rural areas. The largest cities are Shanghai, on the southeastern coast, and Beijing, the capital, with 6.3 and 5.5 million inhabitants, respectively. Including the rural populations of the administrative districts, Shanghai has almost 12 million people and Beijing a little more than 9 million. The largest province is Sichuan, in the south, with more than 100 million people; thus, like Uttar Pradesh in India, if Sichuan Province were an independent nation, it would rank among the world's 10 most populous countries. Overall, China is divided into 22 provinces, 5 autonomous regions, and 3 municipalities.

Some 94 percent of the population of China consists of ethnic Chinese, known as Han (Kaplan et al., 1980). However, China is not unified linguistically: within the Chinese language, many mutually incomprehensible dialects are spoken, although the written Chinese language is uniform and can be understood by all. There are also a number of non-Chinese languages. The official spoken language of the People's Republic of China is "putonghua," meaning "standard speech," which is based on the northern Chinese dialect and is sometimes referred to in the West as Mandarin. China's 54 national minorities--60 million people-- live scattered across the half of China's land mass that they occupy. Speaking a variety of languages, they are encouraged by the authorities to maintain if not strengthen their cultural and linguistic identities.

CHAPTER 2

SOURCES AND QUALITY OF DATA

DATA SOURCES

The People's Republic of China had an enumerated total population in 1982 of more than 1 billion persons. The population has experienced dramatic recent reductions in birth and death rates, apparently surpassing the changes in any other very large less-developed country. These general features of the Chinese population had until recently been revealed in scattered information, such as travelers' reports, short news dispatches, and occasional sketchy official releases. Since the late 1970s, however, information on the population of China has been enriched by the sudden availability of a treasure of detailed demographic data--data relating both to the recent past and to the early years of the People's Republic.

Census and Fertility Survey Data

The 1982 Census and the 1982 Fertility Survey. The major sources of detailed information are two large data collection efforts that took place in 1982. The first of these was the 1982 census of population in which a field staff of 5.1 million enumerators counted a total of 1.008 billion people. The second effort was a sample survey conducted by the State Family Planning Commission, also in 1982. This survey obtained information about the complete childbearing and marriage histories of a sample of women aged 15-67. The households included in the survey had a population totalling more than 1 million. The survey included data on contraceptive practice, education, occupation, ethnicity, recent abortions, and possession of a one-child certificate.

The results were published (in Chinese) in a 176-page special issue of the journal Population and Economics.

Data from the 1953 and 1964 Censuses. The first modern census of China was conducted in 1953. Very limited results, such as the total population, were revealed in 1954, although fundamental details, such as numbers of persons classified by age and sex, remained unavailable outside of China. A second census took place in 1964; the mere fact that it occurred was not generally known until some years later, and again no details were released. Within the past two years, however, the most essential demographic information--the number of persons of each sex classified by single years of age--from these two censuses has been published. The Ministry of Statistics has also recently published the Statistical Yearbook for 1983 with hundreds of tables, including annual birth and death rates since 1950.

It is now possible to piece together from the newly available information the history of the population of the People's Republic of China from 1950 to 1982 with much more accuracy and more detail than has been possible until now. Indeed, as the following pages show, the accuracy and fineness of detail of the information about the Chinese population now exceed the accuracy and detail of what is known about almost every other less-developed country in the world.

Independence of the Data Sources

The various quantitative comparisons presented in the following pages convey a very surprising degree of consistency among numbers derived from the censuses of 1953, 1964, and 1982 and from the large-scale fertility survey. Some demographers and statisticians have suggested that the consistency of the data results from a lack of independence of the sources and is not convincing evidence of accuracy of the data. This possibility arises because China has a nationwide, comprehensive registration system. Each community maintains a register of the population in which there is a listing of the de jure population, to which an addition is made for each birth and legal in-migrant and a deletion is made for each death and legal out-migrant. The registration system also includes the maintenance of a household book containing a listing of the de jure members of each household. The 1982 census involved a preliminary nationwide updating of the registers in each community, and the registers and the household books played a part in the census itself. The fertility survey, which was conducted about 2 months after the census, used the census as the frame for its 1/1,000 sample and checked the roster of each household included in the sample against the census listing. The hypothesis that consistency may not imply accuracy derives from the possibility that the censuses (and perhaps the survey) were simply readings of the registers. If so, the mechanics of maintaining a register would guarantee that persons listed in 1964 and still alive in 1982 have a consistent age and that, on a national level (with inconsequential international migration), the change in the number listed in a cohort must be consistent with the deletions made as a result of recorded deaths. If the number of children born to a given woman is copied from the register, the number recorded in the 1982 census and the number listed in the sample survey might be the same without being correct.

There are two reasons for rejecting the hypothesis that consistency may not imply accuracy. The first is that the procedures followed in the 1982 census and survey, as published, involved much more than checking the registers. For the census, there was extensive preparation, pretesting, and postenumerative checking along with the actual census. It is also of note that the census was conducted with substantial technical and financial assistance from the United Nations. The census was closely tied to the registers, but only after extensive updating and verification; individual data were verified by the person in question. For the 1/1,000-sample fertility survey, the published descriptions of the procedures specified face-to-face interviews for the detailed marriage and fertility histories.

The second reason for rejecting the hypothesis is that the annual numbers of births derived from a combination of census-based estimates of numbers of women each year and survey-based retrospective data on fertility rates are quite different from official records of the annual number of birtns. In other words, the fertility histories are in wide disagreement with official data on births and so cannot have been derived from the registers.

Characteristics of the 1982 Census and Fertility Survey

Procedures of the 1982 Census. Li Chengrui, the director of the State Statistical Bureau and head of the National Population Census Office, has described the procedures of the 1982 census in detail (Li 1983a and 1983b). The procedures included pretests of the census in successive stages, beginning with a pretest conducted by the central government and extending to pretests in each of China's 2,741 counties, covering a total of more than 25 million people. In addition, the register of the population was updated before the census. Li summarizes these procedures (1983a:337):

> First, from the beginning of 1981 through March 1982, household registration was updated. In a sense, this amounted to a precensus check. During this period, more than 5.7 million household registration personnel, statistical personnel, and other basic-level cadres were mobilized to update household registration throughout the country. They conducted a systematic investigation through household interviews and found and corrected errors: 6.1 double registrations per thousand and 5.4 omissions per thousand. Second, prior to the formal enumeration on 1 July 1982, the enumerators arrived at their census districts and conducted a further investigation. They checked household by household for the "five types of persons" identified in the "Census statute" manual. During this procedure, further errors were found and corrected. Based on the information from a subset of areas, double registrations were found to amount to 3 per thousand population and omissions to 2.5 per thousand. Third, after the conclusion of the census enumeration, 10-20 days were spent rechecking household by household and person by person all the census questionnaires. Some errors were again found and corrected. Based on the information from a subset of areas, during the recheck, double countings of 0.1 per thousand and omissions of 0.2 per thousand were found and corrected.

Following these precensus and census procedures, there was a post-enumeration survey (Li, 1983a:338):

> . . . the population census offices of the provinces, municipalities, and autonomous regions first selected, by multistage random sampling, 972 production teams and resident groups (a total of 187,362 persons according to the census) as the survey units. The provincial, prefectural, and county-level offices then selected persons who were of higher educational level and were conscientious and responsible in their work to undergo special training to become sample enumerators. They conducted the postenumeration survey in the selected sample units household by household and then compared the figures obtained with the figures of the original census enumeration. When errors were found, a second check was made before the data were corrected. Based on the stipulations, the census personnel who originally carried out the census enumeration in these production teams and resident groups were not selected as sample survey enumerators . . . . The sample check mentioned above shows a net overcount of 0.15 per thousand.

On the specific issue of the dependence of the census on the register, Li writes that the census included (1983a:339-340):

1. De jure population: 990,658,313
2. Persons who lived in the local area for more than one year but whose residence is registered elsewhere: 6,364,518
3. Persons who have lived less than one year in the locality but have left their place of registered residence for more than one year: 210,322
4. Persons who are living in the locality but whose residence registration is still pending: 4,754,602
5. Persons who originally lived in the locality but are working or studying abroad and have no residence registration: 56,930

> The population of types 2 through 5 totals 11,386,372. These are persons who are not included in the local household registration books. The 4.75 million persons whose household registration is still pending have not been omitted from the census enumeration. They are listed as the fourth type and are included in the census population total. The figures given above are sufficient evidence that the population census is absolutely not a repetition of the household registration.

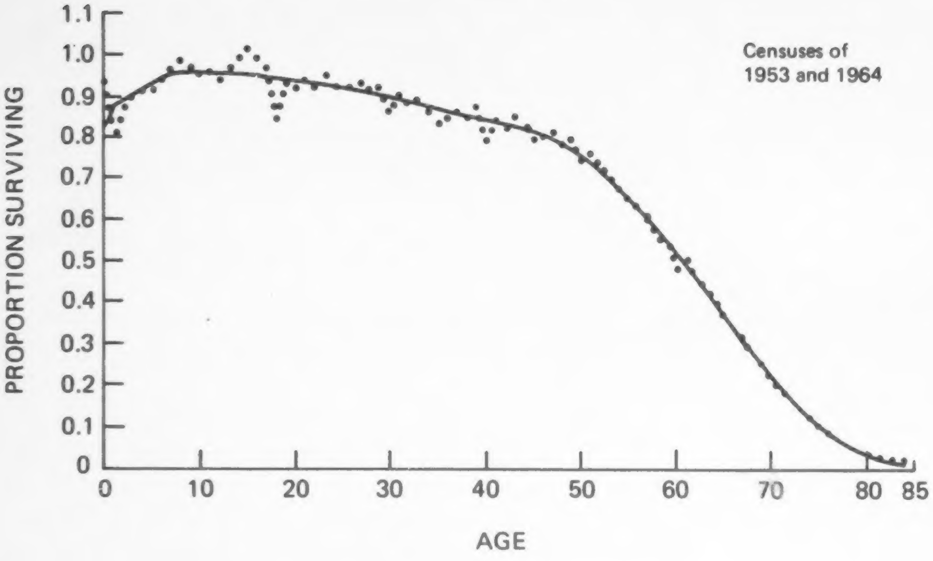
Features of the 1982 Fertility Survey. The large-scale survey of fertility conducted by the State Family Planning Commission in September 1982 (described in Xiao, 1983), had a reference date of July 1, the same date as the census. The sample frame was the census listing itself. It was a stratified self-weighting cluster sample, covering all households in 815 areas: 732 rural production brigades and 83 urban residents' committees. The total population in the survey was a little more than 1 million, involving a sampling fraction of about 1/1,000. The choice of such a very large sample size was based on the calculated number of respondents required to yield 95 percent confidence limits for the peak single-year age-specific fertility rates that would differ by only 5 percent from the rate calculated from the sample, after allowance for the greater variance in a cluster sample than in a simple random sample.[1] Because the sample was so large, estimates of age-specific fertility rates and rates of first marriage by single years of age extending back into the 1950s have remarkably low sampling variability. The estimated annual total number of births in China (and the associated crude birth rates and total fertility rates) are derived from the reported numbers of births in the sample, which range from about 15,000 for each year in the 1950s to more than 20,000 for 1981. The sampling standard deviation of such large numbers is no more than about 1 percent.

The survey had two parts, the survey of the de jure population to establish the composition of the households included in the sample and the detailed survey encompassing a variety of information about "qualified women"--all women aged 15-67. Data on the de jure population was copied from the results of the census, with verification of changes that might have taken place since July 1 using sources in the local areas (presumably the registers plus local informants). But great emphasis was put on the requirement that the survey of qualified women should be conducted by face-to-face interviews. The instructions on obtaining information in these interviews were explicit and detailed. They included specifications that all ages shall be entered in completed years and all dates in the solar calendar. An explanation of the relations among animal symbols, Chinese ages, solar ages in completed years, and solar and lunar calendars was included.

QUALITY OF DATA

Data By Single Years of Age

Consistency of the Census Age Distributions. Figure 4 shows the proportion of women surviving from one census to the next classified by single years of age at the earlier census: the survival ratios are for 1953 to 1964 and 1964 to 1982. Also shown in Figure 4 are survival ratios extracted from a life table expressing the proportion that would survive from birth to each age in a hypothetical cohort subject to the average mortality rate at each age for the intercensal interval.[2] The surprising feature of the single-year survival ratios calculated directly from the censuses is that there is so little irregularity. In most censuses the reported age distribution is distorted by what demographers call age-heaping, a tendency for too many persons to be reported at ages that respondents favor (usually ages ending in 0 or 5). However, because most intercensal intervals are either 5 or 10 years, the effect of age-heaping on survival ratios is usually dampened because preferred ages (e.g., 30 and 40) are in both numerator and denominator of the ratios. In China the intercensal intervals are 11 years and 18 years, but the survival ratios show almost no effect of age-heaping: from 1953 to 1964 the survival ratios for women aged 30, 35, 40, 45, 50, and 60 in 1953 are slightly too low (a favored age is in the denominator) and ratios at 29, 39, and 49 are slightly too high (a favored age is in the numerator), but the effect is very small. The high survival ratio from age 0 in 1953 to age 11 in 1964 is almost certainly the result of an undercount of infants under age 1 in 1953, possibly caused by age misstatement that inflates the number at age 1, leading to too low a survival ratio for this cohort. Other defects in the data are indicated



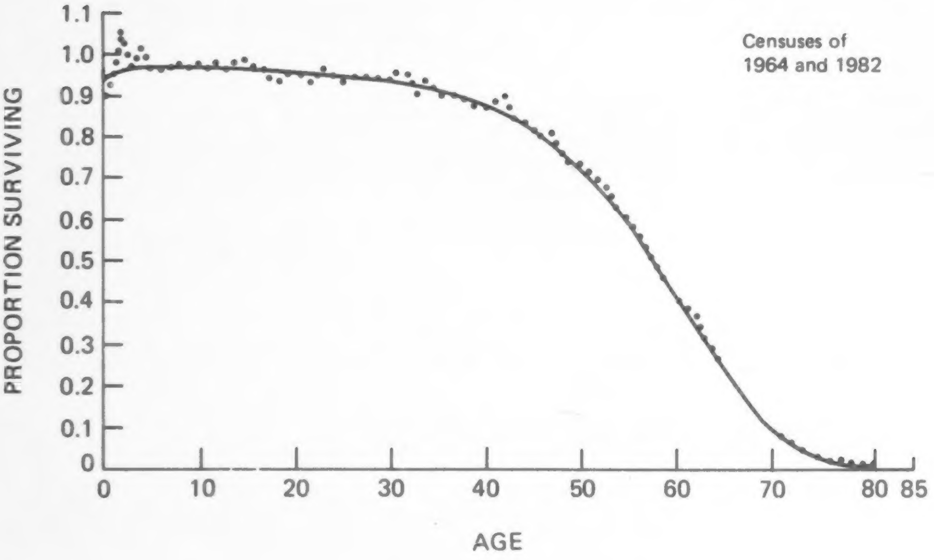


FIGURE 4 Proportion of Females Surviving Between Successive Censuses for Each Age (solid line is proportion derived from intercensal life table, dotted line is ratio taken directly from the census enumerations): China

by survival ratios above 1.0 at ages 2 and 4 in 1964-82 and at age 15 in 1953-64.

The limited fluctuations in the survival ratios indicate highly uniform completeness of coverage by age and extremely limited age misreporting. That very accurate information about age can be obtained from a Chinese population is well known. The reason is a cultural one. People of East Asian culture (Chinese, Japanese, Korean, etc.) almost universally know their date of birth, even when illiterate, usually in terms of the animal year of birth (in a cycle of 12 animals and 5 different qualities for each animal, a complete cycle that repeats every 60 years) and the lunar month. Because of this knowledge, if age is determined through a question asking the date of birth, followed by use of a formula that converts the animal year and lunar month to a Western date, age can be determined with precision. Evidently, such a procedure was used in all three censuses.

Consistency of Census and Fertility Survey Data. The data collected and tabulated from the large-scale fertility survey conducted by the Ministry of Family Planning in 1982 are even more remarkable than the census data in their internal consistency. The published tables include rates of childbearing by single years of age and single calendar years for women aged 15-49 for the years from 1950 to 1981. Analogous rates of first marriage by age are also included in the publication. These rates are derived directly from the births and marriages reported in the survey; because the dates of events are accurately reported, the age of each woman at the time of marriage and of each birth is readily determined.

The listing of birth rates by age of woman makes it possible to construct an annual series of the total number of births in China for each calendar year from 1950 to 1981. In order to construct that series, the number of women by single years of age from 15 to 50 in each calendar year is calculated by interpolating between the number in each cohort recorded in two censuses. That is, one can determine with good precision (on the assumption that the censuses are accurate) the number of persons at age 15 in 1954 by subtracting from the number 14 in 1953 one-eleventh of the decrease in this cohort between its enumeration in 1953 at age 11 and its enumeration in 1964 at age 25.[3] The number of births that occurred in each year is then calculated by multiplying the number of women at each age (determined through cohort interpolation of census data) by the age-specific rate of childbearing taken from the fertility survey and summing these births for all women aged 15-49. (The number of women classified by single years of age from 15-49 in each year appears in Table A-1. Tables that contain primarily raw data or large sets of calculated data are included in the appendix.) The numbers of births so calculated from 1951 to 1981 permit a sensitive test of the consistency of the fertility rates from the survey with the data on age distribution in the censuses of 1964 and 1982. For example, the number of persons at age 5 (i.e., between exact age 5.0 and exact age 6.0) in 1964 must equal the number born between July 1, 1958, and July 1, 1959, multiplied by the proportion who survived from birth to age 5.[4] The number of persons aged 23 in 1982 must equal the number at 5 in 1964 in this cohort multiplied by the proportion who survived from 1964 to 1982. Appropriate survival rates have been extracted from intercensal life tables derived from the censuses and the estimated numbers of births.

In short, there are two sets of numbers for the population classified by single years of age from 0 to 11 in 1964 and from 0 to 29 in 1982. One set is taken from the census and the other from estimated births and survival rates from the survey--the births calculated from retrospective fertility rates combined with interpolated numbers of women and the survival rates from intercensal life tables. In Figure 5 the two sets of numbers are compared. The agreement is extraordinary, especially since the reallocation of births from calendar year to fiscal year is necessarily only approximate and would be so even if the number of calendar-year births were exact.

Abnormal Ratios of Men to Women in Census and Survey Data

Omission of Males from the Census Age Distributions.

A systematic deficiency in the reported age and sex distributions in the Chinese censuses becomes evident when the ratio of men to women at each age is plotted. Such plots are shown in Figures 6 and 7. In each census it is apparent that the number of males in the young adult span--from 16 to 40 in 1953, from 16 to 24 in 1964, and from 16 to 23 in 1982--is too low, because of the

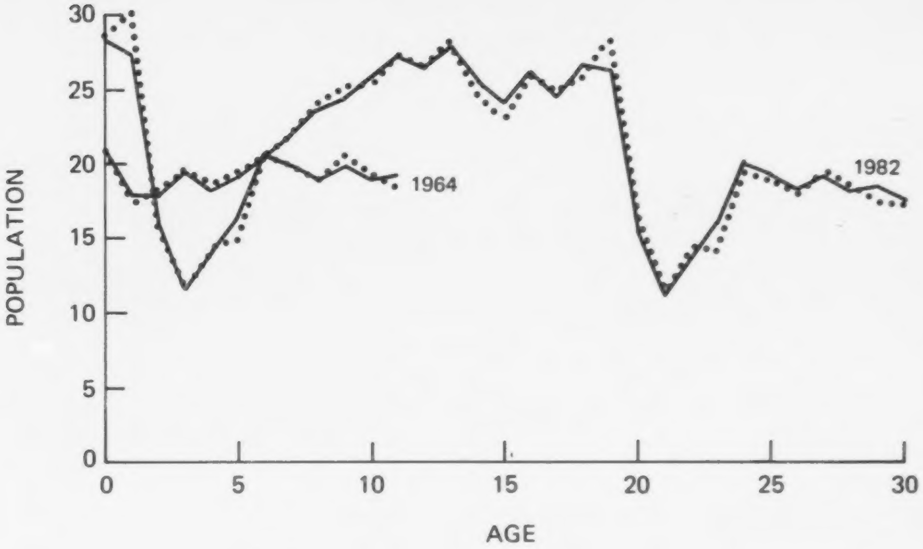


FIGURE 5 Number of Persons Under Age 30 in 1982 and Number of Persons Under Age 11 in 1964 (in millions) by Single Years of Age, as Projected (solid line) and as Enumerated in the Census (dotted line): China

omission of males, mostly those who are in the army. The 1982 census lists the number of males and females in the army, although without giving their ages. The number in the army is 4.2 million, of whom 109,000 are female. In 1953 the news release that reported the conduct of the census gave a population of 574.2 million who were "directly enumerated," and an additional 8.4 million who were indirectly enumerated. The recently released single-year age distribution for 1953 totals only 567.4 million. The 6.8 million difference between the total for which an age distribution is released and the total that was directly enumerated may be taken as the number of persons in military service. Ostensibly the 1964 census included the army, but it is evident from the ratio of males to females in the ages of principal military service that a large number of males at these ages were omitted. In 1953 and 1982 an adjusted age distribution was constructed by allocating the known or estimated number of persons in the armed services age by age, using a rough estimate of the ratio of males to females at each age based on the ratio at ages prior to the range of military service and the ratio at ages above

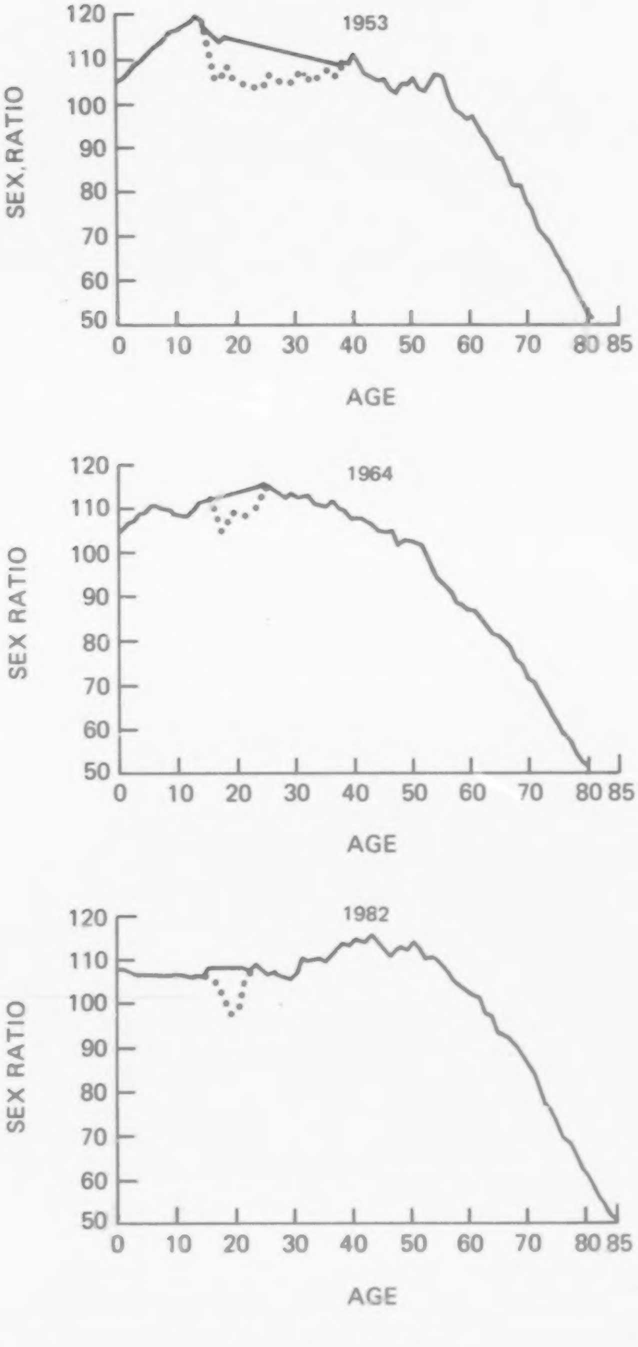


FIGURE 6 Sex Ratio (males per 100 females) by Single Years of Age (dotted line represents original data, solid line includes estimates of males in armed services), 1953, 1964, and 1982: China

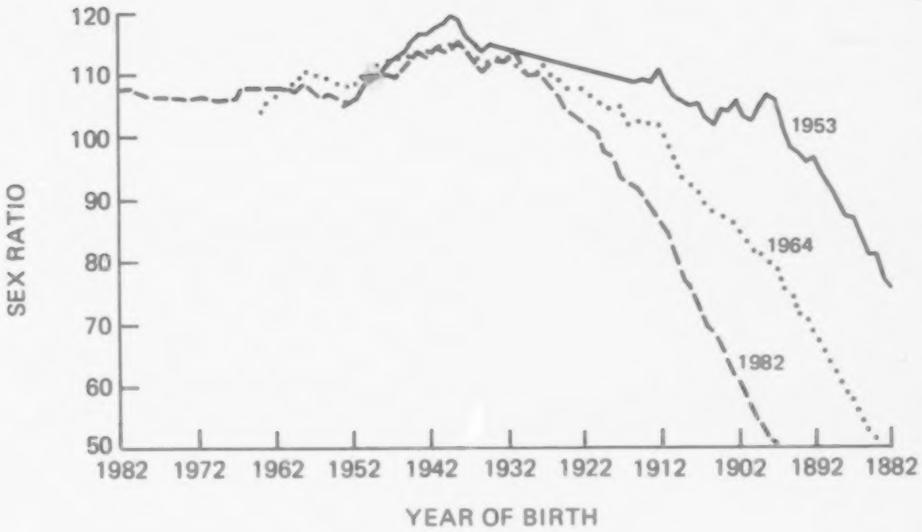


FIGURE 7 Sex Ratio (males per 100 females) by Year of Birth for Censuses of 1953, 1964, and 1982 (estimated number of males in armed services included): China

Note: Year of birth refers to 12 months calculated as of January 1 of given date.

this range. A similar procedure was used to add males at ages 16-23 in 1964, but without a listed total in the army from official data. (The adjusted age distributions are given in Table A-2.)

A remarkable feature of the male/female ratios in the three censuses is the increase in the ratio with age in all three censuses, from a moderate ratio for the cohorts born around 1951 to a ratio of 115 males or more per 100 females for those born in 1940, and the continued high ratio of males to females for cohorts born still earlier. The normal expectation in a population not gaining or losing significantly from migration is that the male/female ratio will be highest at birth (at about 106 males per 100 females) and decline more or less monotonically with age because of the general prevalence of higher male than female mortality rates. Such a declining male/female ratio occurs at the older ages in the Chinese censuses. The anomalous increase seen for the birth cohorts of 1951-52 back to the cohorts born about 1940 in all three censuses implies that those born before about 1952 experienced higher female than male mortality, contrary to the usual greater viability of females. Another remarkable feature of the ratio of males to females is the precipitous drop in this ratio at older ages, especially the decline in the male/female between 1953 and 1964 for older cohorts. The decline in the proportion male within the same cohort by as much as 25 percent in 11 years suggests an extraordinary excess mortality for males.

Male/Female Ratios in the Fertility Survey. There are two anomalous features of the ratio of males to females in the 1/1,000-sample fertility survey. The first is that the ratio of males to females in the de jure population was 102.8 males per 100 females, compared to 106.8 for the census (Liu and Li, 1983). The standard deviation for the ratio in a sample of 1 million is about 2/1,000, so that the difference cannot be from sampling variation. The difference is mostly from ages 20 to 60; in each five-year age interval the male/female ratio in the census is at least three points higher--and as much as nine points higher at ages 35-39. In view of the consistencies of several kinds in the fertility histories (see below), it may be conjectured that less care was taken in establishing the de jure population of the households than in collecting the detailed marriage and fertility histories.

The second anomaly is puzzling information in a table that lists the number of male and female births in 1981 by sex and birth order in the rural and urban populations. The puzzle is an increase in the male/female ratio as birth order increases, in both rural and urban populations. In most populations the ratio of male to female births is about 1.06, and in well-recorded vital statistics there is only a slight difference in the male/female ratio of births at different birth orders--a difference in the direction of a very small reduction in the ratio as birth order rises. In the Chinese fertility survey the ratio of male to female births in the rural population is 1.046 for first births, 1.069 for second births, and 1.124 for births of third and higher order. In the urban population, the ratio is 1.085 for first births and 1.178 for births of second and higher order. (There were only 257 urban births above the first order reported for 1981.) The male/female ratio of 1.055 among rural births of first and second order in 1981 is very close to the normal ratio, but there is a marked increase in the ratio with birth order--above first-order births in the urban population and above second- order births in the rural population. The reality of this increase can be challenged on the basis that it may be the effect of mere random variation in the male/female ratio when the number of births is small. The standard deviation of the ratio of male to female births caused by stochastic variation is approximately $2\sqrt{n}$ when n is the total number of births. Since there were only 257 urban births of second or higher order, the ratio of 1.178 for higher-order urban births differs by less than one standard deviation from a normal ratio of 1.06; the possibility that the high male/female ratio occurred by chance cannot in this instance be ruled out. However, the male/female ratio of 1.124 for rural births of third or higher order (there were 5,957 such births reported) is 2.47 standard deviations above 1.06. It is scarcely possible that the uniformly higher male/female of urban births and the regular increase in the ratio with birth order in both rural and urban births are the results of sampling quirks.

The relatively high male/female ratios in higher-order births might be the result of simple underreporting of higher-order females births in the survey. It is understandable that a higher-order birth that occurred contrary to the one-child campaign would be unregistered because the parents would want to conceal such a birth. Given the cultural preference for males, local officials might be sympathetic in registering a higher-order male birth and join in keeping unregistered a higher-order female birth. Comparison of births reported in the survey for 1981 and registered births shows that more than 3 million births in that year were not registered. It is possible that the much more complete reporting in the survey still omitted the births of surviving female children.[5] Sex-selective abortion is not yet technologically feasible and certainly not in the rural areas. A possibility that remains is unreported sex-selective infanticide. Such a practice would likely be unreported in an official survey and might rise with birth order because of the increasing penalties accompanying higher-order births. There are many reports of female infanticide in the Chinese press; it is mentioned as a possible explanation of the high male/female ratio of the higher-order births by Liu and Li (1983).

Official Data on Births and Deaths

Official Figures of Annual Numbers of Births. As noted above, the age-specific fertility rates constructed from the fertility survey can be combined with the calculated number of females by single years of age to produce estimates of the annual number of births. The annual number of births so constructed can be compared with the annual number taken from official sources, presumably based on the number of births registered (see Table 1). The estimated number exceeds the official number with only one exception. The ratio of the official figures to the constructed figures is a valid estimate of the completeness of the official figures since the estimated figures are very consistent with the numbers counted at each age in the censuses. Completeness of official reporting in each year is shown in Figure 8, together with a three-year moving average of completeness.

The moving average is useful to show the general trend of completeness of recording, free of large year-to-year fluctuations. There are two likely reasons for the fluctuations. One reason is imperfect conversion of date of birth in the fertility survey to the western (solar) calendar if the year of birth was reported in the Chinese (lunar) calendar. According to the Chinese calendar, years of 12 lunar months are interspersed, irregularly, with years of 13 lunar months. If year of birth was reported according to the Chinese calendar, there would be too many births reported in the 13-month years and too few in the 12-month years. The result would be understated estimates of completeness of recording in 13-month years and overstated estimates in the other years. In Figure 8 the 13-month years are labeled; it is clear that too many births were reported in those years. The second reason for large year-to-year fluctuations in the sequence of estimated completeness of reporting births is a possible tendency to report births in the year following their occurrence. An unusually large degree of delayed reporting might reduce estimated completeness in one year and increase it in the next. The most puzzling estimate of completeness of reporting is the high estimate for 1967 (more than 1.0 before correction for the effect of the use of a lunar calendar). There may be some connection between this anomaly and the disruption that resulted from the Cultural Revolution, which had just begun.

TABLE 1 Annual Number of Births (in millions) from Official Figures and as Calculated from Fertility Rates in Survey and Interpolated Populations, and Estimated Completeness of Reporting, 1953-82: China

	Number of Births		
Year	Official	Calculated	Completeness of Reporting
1953	21.51	24.54	.877
1954	22.45	25.76	.877
1955	19.79	25.94	.763
1956	19.76	29.45	.808
1957	21.67	27.13	.799
1958	19.05	24.16	.788
1959	16.47	18.48	.892
1960	13.89	17.38	.799
1961	11.88	14.52	.818
1962	24.60	26.78	.918
1963	29.54	33.53	.881
1964	27.29	28.01	.974
1965	27.09	27.94	.968
1966	25.77	29.28	.880
1967	25.63	25.35	1.011
1968	27.57	31.48	.878
1969	27.15	28.68	.947
1970	27.36	29.98	.913
1971	25.67	29.07	.883
1972	25.66	27.49	.933
1973	24.63	26.14	.942
1974	22.35	25.26	.885
1975	21.04	22.70	.927
1976	18.54	21.64	.857
1977	17.87	19.97	.894
1978	17.45	19.96	.873
1979	17.27	20.95	.824
1980	17.99	17.74	.844
1981	17.46	21.05	.830
1982	(21.26)	(21.56)	

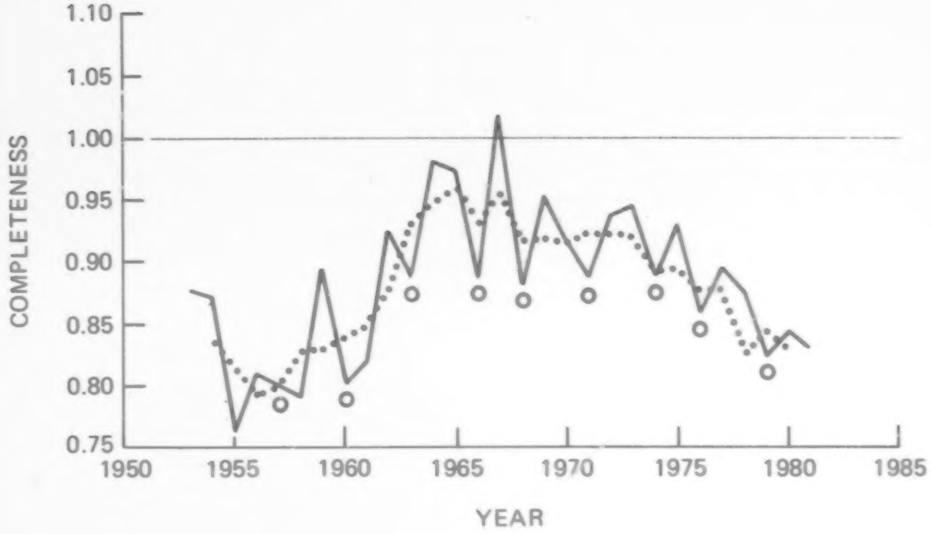


FIGURE 8 Completeness of Recording of Births (dotted line is 3-year moving average), 1953-81: China

Note: Circles designate years with 13 lunar months.

The moving average of completeness rises from about 80 percent in the mid-1950s to above 90 percent from 1963 to 1974; there is a decrease in completeness to less than 85 percent for years in the late 1970s. The official pressure for restriction of the number of births probably led to incomplete recording in those later years, both by parents fearful of penalties and by officials eager to meet targets.

Official Records of Death Rates. The completeness of death registration for each intercensal period as a whole can be estimated on the basis of the total population recorded in each census and the total number of births found to occur in each intercensal period. The difference between the total number of births between two censuses and the intercensal growth in population is the total number of deaths in that interval. The figure used for 1953 in these calculations includes the 8.4 million officially reported as indirectly enumerated; the 1964 figure includes an estimated 2.35 million young males omitted from the census, an estimate obtained by correcting understated ratios of males to females from age

16 to age 24; and the 1982 figure includes the official number in the armed service, whose ages were not reported. The number of deaths calculated in this way can be compared with the number implied by official figures for the population each year and with the annual death rate (State Statistical Bureau, 1983b). The calculations are as follows:

	Period	
	1953-64	1964-82
Calculated Births (millions)	265.4	448.6
Intercensal Increase in Population (millions)	114.3	311.3
Calculated Deaths (millions)	151.1	137.3
Official Number of Deaths (millions)	93.7	115.8
Completion of Recording of Deaths (percent)	0.620	0.843

The aggregate completeness of recording of deaths is 62.0 percent for 1953-64, and 84.3 percent for 1964-82. The degree of understatement, especially in the earlier period, is surprising, but it is hard to see how the omission of deaths could in fact have been much less. The consistency between the calculated annual births and the census enumerations by age was noted earlier; besides, it seems unlikely that respondents in the fertility survey overstated the number of births that had occurred to them. This possibility is especially remote because of the extraordinary agreement (mostly within 1 percent) between the number of children ever born by five-year age intervals constructed from the survey and the number reported by women in the same intervals in the 1982 census. The annual number of births estimated for the intercensal years incorporates the census populations as the source of the estimated number of women at each childbearing age, so that the birth estimates are necessarily consistent with the increasing population from one census to the next (if the fertility rates are correct). The other possible source of an overestimate of the omission of deaths in the official data is understatement of the intercensal increase in population--an understatement that would imply that the earlier census was a more complete count than the later one, which is unlikely.

Comparison of the total number of registered births with the estimated total for the same intercensal periods leads to an estimate of average completeness of birth registration of 84.2 percent in 1953-64 and 91.2 percent in 1964-82. If a large fraction of the omitted births were births soon followed by an infant death that also went unrecorded, much of the estimated underrecording of deaths would be accounted for. The estimated number of unrecorded births in 1953-64 is 41.9 million, and the estimated number of unrecorded deaths is 57.4 million; the corresponding numbers for 1963-82 are 40.4 million unrecorded births, and 21.5 million unrecorded deaths.

These calculations are sensitive to the relative completeness of enumeration in the census. For example, if the 1964 census was undercounted by 2 percent more than the other two censuses, the calculated intercensal births would be increased by about 1 percent, the 1953-64 increase in population would be augmented by 13.9 million, and the 1964-82 increase would be diminished by the same amount. The estimated completeness of death recording would then be 67 percent for 1953-64 and 74 percent for 1964-82.

In the analysis of mortality in Chapter 5, three other sources of data are used for comparative purposes. One is an epidemiological survey conducted throughout China in 1973-75 in which deaths by age and sex and an age distribution of the population were recorded; the second is another large-scale survey in 1978 covering a sample population of over 100 million, reported in *System Engineering and Science Management* (Beijing) February, 1980, and the third is a life table constructed from the deaths in 1981 recorded in the 1982 census.

Data on Children and Marriage

Consistency of Survey and Census Data on Number of Children Ever Born. In addition to the consistency test described above ("Consistency of Census and Fertility

Survey Data"), a second test of the consistency of the age-specific fertility rates derived from the fertility survey and the 1982 census provides further evidence of very precise data. The age-specific fertility rates presented in the report of the survey for calendar years of time are converted into estimated fertility rates for fiscal years (July 1 to June 30) by a simple arithmetic average of the rates in two consecutive years. The rate of childbearing for women aged 15 in 1977-78, plus the rate of those aged 16 in 1978-79, plus the rate of those aged 17 in 1979-80, plus the rate of those aged 18 in 1980-81, plus the rate of those aged 19 in 1981-82 equals the average number of children ever born to women reaching exact age 20 in the middle of 1982.[6] By an analogous summation the estimated number of children ever born to women of each exact age from 16 to 65 can be ascertained. Then the average number of lifetime births of women at conventional single-year age intervals (15-16, 16-17, etc.) can be obtained by averaging (but using the geometric mean for the number born to women below age 20, to allow for the nonlinearity of the increasing number of children ever born at the youngest ages). Finally, the average number of children ever born to women at age 15 can be multiplied by the number of 15-year-olds in the 1982 census; the sum of such products for ages 15 through 19 yields the total number of children ever born to women aged 15-19. In Table 2 the total number of children ever born to women by five-year age intervals from ages 15-19 to 55-59 as constructed by this procedure is compared with the total number of children ever born reported by women in these age intervals in the 1982 census. The degree of consistency is remarkable: at 15-19 and 20-24 the constructed number of children ever born is within 2 percent of the census number; above age 25 for every age interval the agreement is within 1 percent.

Consistency Between Survival Rates of Cohorts and Proportion of Children Ever Born Reported as Surviving. William Brass was the originator of a widely used system for estimating child mortality from the fraction of children reported as surviving among the children ever born to women at different ages (Brass, 1968; United Nations 1983). One estimates the fraction of births that occurred to women in each time interval before a census or survey and selects a mortality schedule (e.g., from model life tables) that would yield the reported

TABLE 2 Total Number of Children Ever Born to Women Classified in Five-Year Age Intervals, 1982: China

	Number of Children Ever Born (millions)		
Age of Women	From 10 Percent Sample Tabulation of Census	Constructed from Age-Specific Fertility Rates in Survey	Ratio: Survey/Census
15-19	0.873	.859	.984
20-24	15.29	15.08	.986
25-29	71.27	71.51	1.003
30-34	96.68	96.66	1.000
35-39	97.36	96.92	.996
40-44	104.67	104.00	.994
45-49	119.54	118.62	.992
50-54	109.42	109.03	.996
55-59	90.79	90.81	1.000

proportion surviving, given the time distribution of the births. If c(a) is the proportion of the children ever born to women aged 25-29 who were born "a" years before the census or survey and p(a) is the fraction of these children surviving from birth to the census or survey date, then the overall proportion surviving, P, necessarily equals $\int_0^{\omega} c(a)p(a)da$, when ω is the time between the earliest birth and the census date. Brass' technique is to estimate c(a) from information about the fertility history of the women in question, and by trial and error (or the logical equivalent) to select a survival function, p(a), that is consistent with the reported proportion surviving among the children ever born to these women.

In the 10 percent sample tabulation of the 1982 census there are tables listing the number of children ever born alive, and the number of children surviving, for women classified in five-year age intervals from 15-19 to 55-59. For each age group of women the fraction of the children they have borne that were born in each year prior to the census can be determined from the age-specific fertility rates recorded in the fertility survey (which had the same effective date as the census). Consider women at exact age 20 in mid-1982: The births they had at age 19 occurred in 1981-82, those they had at age 18 in 1980-81, at 17 in 1979-80, at 16 in 1978-79, and at 15 in 1977-78. From age-specific fertility rates, one can calculate the fraction of births to those women that occurred at specified single-year periods in the past. A similar calculation can be made for women at exact age 18 in 1982; an average of the fraction in each period for those aged exactly 18 and those aged exactly 19 is a robust estimate of the fraction born in each period to women who were 18-19. Combining such calculations for women aged 15-16, 16-17, 17-18, 18-19, and 19-20, one obtains an estimate of the fraction of the children born alive by women 15-19 whose birth occurred in 1981-82, the fraction whose birth occurred in 1980-81, etc. The proportional distribution of births by fiscal year before the censuses, calculated in this manner, is shown for each group of women from 15-19 to 50-54 in Table A-3.

The distributions in Table A-3 are single-year interval tabulations of the function c(a) that is combined with the proportion surviving, p(a), in the Brass equation: proportion surviving $= \int_0^{\omega} c(a)p(a)da$. It would be possible to try different cohort survival functions and choose which among a set of possible p(a) functions is consistent with the proportion surviving reported in the census. Instead, a value of p(a) for each birth cohort is taken from Table 3, in which the survival ratio from birth in a given year to enumeration in 1982 has been calculated as the ratio of $({}_1N_a)_{82}/B(82-a)$, where $({}_1N_a)_{82}$ is the number enumerated at age a to a + 1 in 1982, and B(82-a) is the number of fiscal-year births a years before mid-1982. The fiscal-year births are based, in turn, on interpolated populations of women of childbearing age and age-specific fertility rates for each year in the past from the fertility survey. In other words, instead of using the Brass equation to chose a p(a) function from some arbitrary set of such functions, the equation is used to calculate the proportion of children surviving among the children ever born to women in each five-year age interval. The determination of proportion surviving uses a c(a) for each age group of women derived from their fertility histories and a p(a) for each cohort derived from the census enumeration and estimated births. The result is a set of *constructed* proportions surviving (based primarily on the fertility histories from the survey) that can be compared with the proportions *reported* in the census. The comparison is shown in Table 4.

TABLE 3 Estimated Fiscal Year Births, 1951-52 to 1981-82, Number Recorded in Corresponding Cohort in 1982, and Proportion Surviving: China

Age in 1982	Year of Birth	Fiscal Year Births (millions)	Number in Census (millions)	Proportion Surviving
0-1	1981-82	21.71	20.81	.959
1-2	1980-81	18.93	17.38	.918
2-3	1979-80	19.06	18.27	.959
3-4	1978-79	20.87	19.62	.940
4-5	1977-78	19.63	18.63	.949
5-6	1976-77	20.67	19.42	.939
6-7	1975-76	22.07	20.42	.926
7-8	1974-75	24.00	21.78	.907
8-9	1973-74	25.86	24.03	.929
9-10	1972-73	26.73	25.09	.938
10-11	1971-72	28.33	25.22	.891
11-12	1970-71	29.88	27.33	.915
12-13	1969-70	29.09	26.50	.911
13-14	1968-69	30.68	28.24	.920
14-15	1967-68	28.28	24.52	.867
15-16	1966-67	26.72	22.74	.851
16-17	1965-66	28.10	25.97	.892
17-18	1964-65	27.11	24.78	.915
18-19	1963-64	31.61	25.78	.815
19-20	1962-63	32.38	28.59	.883
20-21	1961-62	19.46	16.59	.852
21-22	1960-61	14.28	11.20	.784
22-23	1959-60	17.57	14.51	.826
23-24	1958-59	21.08	14.29	.678
24-25	1957-58	26.69	19.45	.729
25-26	1956-57	25.97	18.89	.727
26-27	1955-56	24.88	17.92	.720
27-28	1954-55	26.20	19.67	.751
28-29	1953-54	25.00	18.62	.747
29-30	1952-53	25.52	17.49	.685
30-31	1951-52	24.44	17.36	.711

The agreement between constructed and reported proportions surviving is remarkably close for women aged 25-29 to 40-44. The deviation at the youngest age intervals (under age 25) is explained by the fact that survival of children is not independent of age of mother. The construction for women aged 15-19, for example, uses the estimated survival ratio for all births in 1981-82, 1980-81, and 1979-80; but in fact the infant

TABLE 4 Proportion of Children Surviving Among Children Ever Born Alive to Women Aged 15-19 to 50-54, 1982: China

Age of Woman	Constructed from Fertility Survey	Reported in Census
15-19	.949	.920
20-24	.944	.938
25-29	.940	.936
30-34	.927	.925
35-39	.903	.903
40-44	.876	.877
45-49	.826	.843
50-54	.764	.801

mortality rate among first births and among children born to very young women is higher than the general infant mortality rate. The deviation at ages 45-49 and 50-54 may be caused either by a slight overstatement of proportion surviving in the census reports by older women or by a slight overestimate of births in the early 1950s (for which the fertility rates of older women are not based on retrospective data because of the age limit of 67 years in the survey). Another possibility is that at higher ages differential mortality among mothers may have left respondents with relatively favorable mortality experience and with children who also had higher than average survival rates.

The basic agreement between reported and constructed proportions attests to the probable validity of the cohort survival ratios--not to the validity of individual ratios, but to the average survival of groups of cohorts. Individual survival ratios can be in error because the estimation of fiscal-year births involves an arbitrary element and because of slight deviations of the reported time of birth caused by incomplete adjustment from the lunar to the solar calendar.

Consistency of First-Marriage Rates and Marital Status Data. When the single-year rates of first marriage are cumulated for persons aged 15 in year t, 16 in t + 1, and 17 in t + 2, the resultant sum is the proportion of ever-married women at exact age 18 at the end (December

31) of year t + 2. By such cumulations the proportions of ever-married women at age a and a + 1 at the beginning and end of each year can be determined; the average of these four numbers is an estimate of the proportion of ever-married women in the middle of the year of those between ages a and a + 1.

The proportion of ever-married women aged 15-35 from 1950 to 1981 calculated in this way is shown in Table A-4, which also lists the proportion of ever-married women in 1982 as ascertained in the de jure listing of households. The series of constructed proportions in 1980 and 1981 are very similar through age 19 to the reported proportion in 1982; above age 20 the increase in proportion married from 1980 to 1981 and from 1981 to 1982 reflects the rise in first-marriage rates.

The proportion of ever-married women by age are tabulated at 15-19 and by single year of age from 20 to 29 in the 10 percent tabulation of the 1982 census. For women aged 22 to 29 the proportion ever-married in the survey differs by at most 0.005 from the proportion in the census, but for women aged 15-19 the proportion is 2 percent greater in the survey (.062 compared with .042), and at 20 and 21 the proportion ever married in the survey exceeds the proportion ever married in the census by 1.2 percent and 0.9 percent, respectively. In the survey the enumerators were instructed to include as married those for whom no marriage certificate had been issued but who were recognized as being married by the family and the society (Xiao, 1983). This explainable difference is further evidence that data for the census and survey were not simply copied from the same register.

Quality of Data: Summary

A number of results have emerged from this examination of the quality of Chinese population data. The most important is the good but not perfect accuracy of the fertility and marriage information collected in the large-scale fertility survey. The retrospective fertility data provide the basis for constructing an annual series of births and birth rates, which is an addition to the published total fertility rates. The number of births in this series exceeds the number of births listed in official sources by a substantial margin; the fertility data could not have been copied from registers. In fact, the synchronism of low points in the ratio (of the number of officially reported births to the number of calculated births) with years containing 13 lunar months is evidence that the fertility histories were obtained from respondents. In addition, there is a slight systematic bias in the time sequence of total fertility rates--which are too high in years with 13 lunar months. Further evidence of the independence of the survey from the register (and the census) is found in the higher proportion of ever-married women in the survey than in the census at young ages, a natural result of instructions in the survey to include married persons whose marriages had not been registered.

The consistency of cumulative fertility in the survey with the number of children ever born in the census is so close that independence is hard to believe. Nevertheless, there is no doubt, given the explicit nature of the instructions, the overreporting of births in 13-month years, and the excess of births reported in the survey in comparison with the official reports, that the detailed fertility history was in fact obtained by interviews with the qualified respondents. The interviewers might have had access to the total number of children ever born that the respondent listed on the census and might have probed for an omitted birth when the total number reported was less than the census response. But if the detailed fertility history yielded one more birth than the census, the interviewer would have been unlikely to scratch one birth from the survey form and it would not have been impossible to add one to the census. Moreover, the latter would have an inconsequential effect on the census results since the survey was a 1/1,000 sample.

The congruence of the proportions dead among children ever born constructed from the calculated birth sequence and the proportions dead reported in the census is powerful evidence of the validity of the birth sequence. It supports, indeed, the approximately equal coverage of the 1964 and 1982 censuses since the constructed survival rates for children born to women aged 40-44 are heavily weighted by the births estimated around 1964. If the 1964 census had been undercounted relative to 1982, the number of births around 1964 would have been underestimated, the survival rates to 1982 would be too high, and the constructed proportion surviving for women aged 40-44 would exceed the reported proportion.

With some minor exceptions, then, the fertility and nuptiality information taken from the census and survey can be accepted as of high quality; as such, they provide the basis for a valid history of recent trends in China.

CHAPTER 3

MARRIAGE IN CHINA SINCE 1950

The 1/1,000-sample survey conducted in 1982 by the Ministry of Family Planning collected retrospective data on marriages as well as on births. The report of the survey includes tables listing rates of first marriage by single years of age (the number of first marriages in a single-year age interval relative to the number of women in the interval) for each calendar year from 1949 to 1981. It also provides the calculated mean age at first marriage and the total first marriage rate for each year from 1940 to 1982 (Zhao and Yu, 1983). The total first-marriage rate for a given year is the sum of the single-year age-specific rates of first marriage. It equals the proportion that would ever marry in a hypothetical cohort subject to the marriage rates of the year in question.

PROPORTION EVER-MARRIED WOMEN AND THE FIRST-MARRIAGE RATE

Actual cohorts of women in China achieve very close to 100 percent entry into marriage, as is evident in the proportion of women ever married by single years of age in 1982--more than 98 percent at ages 29 and 30 and more than 99 percent at every age over 30. The annual total rate of first marriage has nevertheless differed from unity in most years, often substantially. It reached a low of .74 in 1959, during the Great Leap Forward, a high of 1.19 in 1962, as the economy and society recovered from the Great Leap Forward and the "bitter years" of 1960-61; and fell again to .71 and .73 in 1965 and 1966, at the beginning of the Cultural Revolution (see Figure 9). The lowest point of .64 was reached in 1973, in the midst of a rapid rise in the mean age at first marriage. From

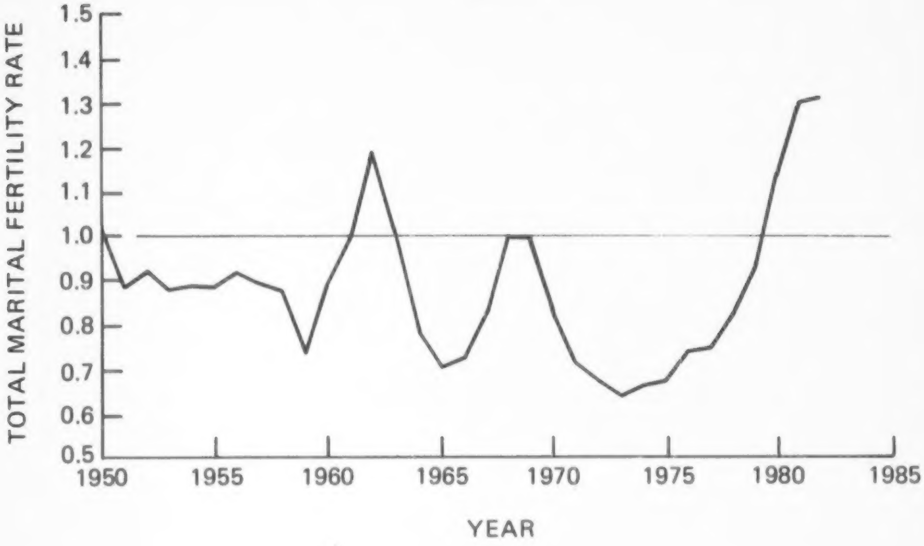


FIGURE 9 Total Female First-Marriage Rate (sum of first marriage frequencies), 1950-82: China

1971 to 1979, while mean age at first marriage was increasing from 20.29 to 23.05--an addition of almost one-third of a year each year--the total first-marriage rate was below 1.0 despite the ultimate achievement of nearly 100 percent ever married within each cohort. In 1980 the total first-marriage rate reached 1.14, higher than in any previous year except 1962; in 1981 and the first 6 months of 1982 it rose to a new high above 1.30, a boom in marriages that caused increased births in 1981 and 1982 and will have a continued upward effect on births in 1983.

There are two reasons for differences from unity in the annual total first-marriage rate even when every cohort experiences a proportion ever married very close to 100 percent. One reason is a temporary deficit in the number of marriages in years when social disruption prevents marriages that otherwise would occur and an excess in the number of marriages in the period of recovery from such episodes (for example, the deficit in 1959 and the excess in 1962). The second reason for high or low total rates of first marriage is a change in the mean age at which cohorts marry. When the mean age at marriage of a cohort falls, the total marriage rate rises above 1.0 because the marriages of older and younger women, which would have occurred sequentially with constant mean age, overlap. The total rate continues higher than 1.0 as long as mean age at marriage continues to fall. A rising mean age at marriage has the opposite effect, thinning out the occurrence of marriage until the rise in mean age ceases. The average value of 0.885 of the total marriage rate from 1950 to 1982 (despite the continuation of virtually universal marriage) is the result of the increase in mean age at marriage of about 4 years during this time. According to a formula of Norman Ryder (1956), a period total first-marriage rate is reduced in proportion to the average annual rate of change of cohort age at marriage. An increase of 4 years in 32 years should reduce the average period total first-marriage rate by about 0.125, or to about 0.875--very close to the actual average value of 0.885 for the 32 years in question.

MEAN AGE AT FIRST MARRIAGE

Figure 10 shows the annual value of the mean age at first marriage from 1950 to the first half of 1982. The mean age at first marriage calculated for the decade of the 1940s is little different from the mean for 1950 (18.46 compared with 18.68), but was a year higher than the average (17.52) for the Chinese farm population in 1929-31 (Barclay et al., 1976). The increase in mean age was relatively gradual in the 1950s and 1960s and relatively rapid in the 1970s. The revolutionary government set a legal minimum marriage age of 18 years and introduced many changes in social organization that reduced the incidence of very early marriage. In 1953 nearly 43 percent of women were married before reaching 18; by 1965 this fraction had fallen to about 21 percent; at the beginning of 1982, only 4 percent had married before reaching 18.

The mean age at marriage rose sharply after 1970: in the 8 years from 1971 to 1979 the increase was twice what the increase had been in the 21 years from 1950 to 1971. The rise in age at marriage in the 1970s was certainly enhanced, if not altogether produced, by government pressure as part of the program to reduce the birth rate. The official policy was later marriage, longer birth intervals, and fewer children. Women were encouraged to postpone marriage until age 23 in the rural areas and until age 25 in the cities. From 1971 to 1979

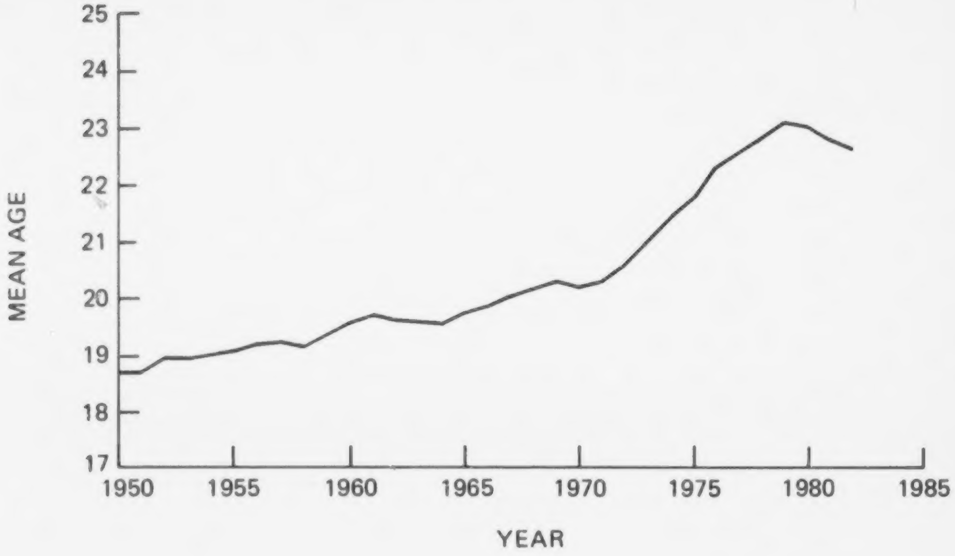


FIGURE 10 Mean Age at First Marriage of Females, 1950-82: China

the reduction in the proportion of women who had ever married before reaching age 24 was large in the rural areas and dramatic in the cities: from 89 to 76 percent in the rural population and from 68 to 20 percent in the urban population.

PATTERNS OF MARRIAGE

By cumulation of age-specific first-marriage rates, the proportion of women ever married at each age can be calculated for each cohort: that proportion is shown for selected female cohorts in Figure 11 (see Table A-4 for data for all years). From the cohort reaching age 15 in 1950 to the cohort reaching 15 in 1965, the curves showing age of attaining successively greater proportions of ever-married women moves to the right--to higher ages--with each cohort, ultimately reaching nearly 100 percent. The cohort reaching age 15 in 1970 has a relatively slow start in entering marriage, reaching 50 percent ever married at an age 2 1/2 years later than the attainment of 50 percent by the cohort only 5 years older (age 15 in 1965). However, the younger cohort made up for its slow early entry into marriage and by age 26 had

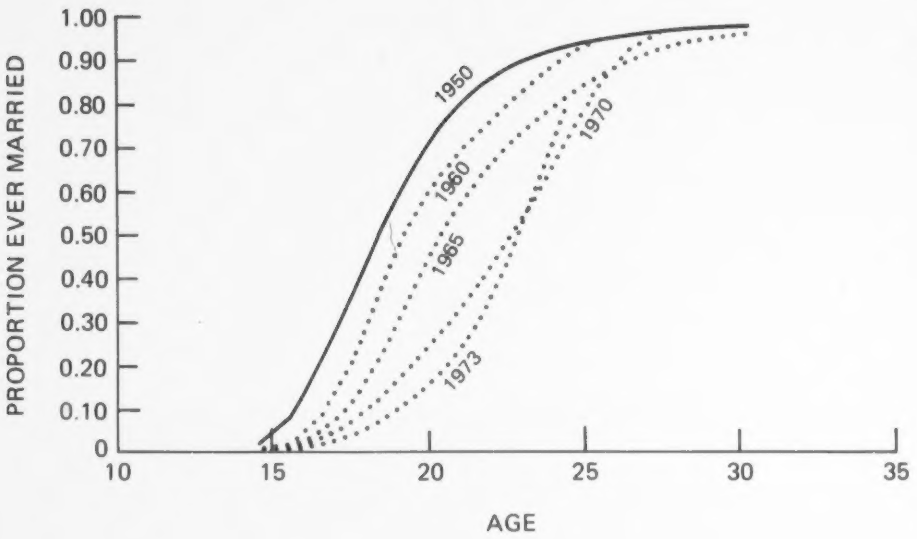


FIGURE 11 Proportion of Ever-Married Women, by Single Years of Age, Cohorts Aged 15 in 1950, 1960, 1965, 1970, and 1973: China

surpassed the proportion married that had been achieved at the same age by the older cohort. Those reaching 15 in 1973 were even slower than the 1970 cohort in entering marriage at early ages and then quickened the pace so as to surpass older cohorts--by about age 24 for the cohort 15 in 1965 and by age 23 for the cohort 15 in 1970.

In Figure 12 the curves showing cumulative entry into marriage for selected female cohorts are compared with a standard curve of cumulative first marriage. The standard curve is a mathematical function of age that with suitable choice of constants fits the marriage experience of many quite different populations. The standard distribution--an asymmetrical curve skewed to the right--fits different experiences, ranging from early-marrying to late-marrying cohorts, if the appropriate starting age (or, alternatively, the proper mean age) and the proper pace of marriage (or the proper standard deviation) is chosen. (The proportion ultimately marrying must also be specified, but in China this proportion can be estimated to a good approximation as 100 percent [Coale, 1971; Coale and McNeil, 1972]). In Figure 12, the standard curve of the proportion of ever-married women is fitted to the experience of each

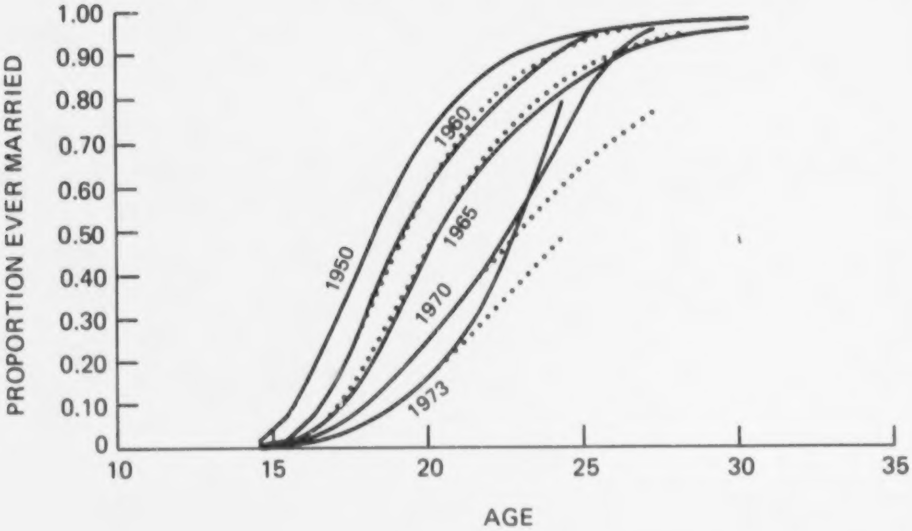


FIGURE 12 Proportion of Ever-Married Women, Cohorts Aged 15 in 1950, 1960, 1965, 1970, and 1973 (solid lines), and Standard Curves Fitted to Ages 16.5 and 20.5 (dotted lines): China

cohort by choosing two parameters (of location and spread) that forces the standard curve to pass through the cohort's recorded proportion ever married at ages 16.5 and 20.5. For cohorts reaching age 15 in 1950, 1960, and 1965, the nuptiality experience past age 20 is fitted very well indeed by the standard curves forced to pass through these early points in the cohort's entry into marriage. Those reaching 15 in 1970 also follow a standard curve fitted to the proportion ever married at 16.5 and 20.5, but only up to age 22; at higher ages the standard curve fitted to these early points rises too slowly--or, more realistically, above age 22 the cohort accelerates its entry into marriage above the slow pace it had followed up to age 22. The cohort of women aged 15 in 1973 departs still earlier and more steeply from the very slow pace of marriage it followed up to age 20.

The existence of a standard frequency distribution of first marriages has a behavioral explanation: it is generated by a normal (Gaussian) distribution of attaining an age considered as marriageable, followed by exponential distributions of the duration of three intermediate stages--the search for the ultimate spouse, the interval between finding the spouse and engagement, and between engagement and marriage (Coale and McNeil, 1972). When age at marriage is governed by accepted social norms and gradually evolving conditions, the standard distribution seems to fit very well.

In the 1970s the intensified program to reduce the birth rate included later marriage as an important component. The legal minimum of age at marriage was not increased (from the 18 years for women set in the marriage law of 1950); however, permission to marry had to be obtained from the administrative head of the work units of bride and groom, and a late marriage rate (the proportion of marriages of women older than 23 in rural areas and older than 25 in cities) was one of the aims imposed by the new population policies (Tien, 1983). Restrictions that slowed down entry into marriage for women under age 23 led to more rapid entry into marriage for women after that age: for example, see the comparison of the 15-in-1970 cohort with the fitted standard in Figure 12.

In 1980 a new marriage law was passed that increased the legal minimum marriage age for women from 18 to 20. The passage of the new law was reportedly accompanied by a relaxation of the measures that enforced later marriage because of the social problems created by postponing marriage past age 23 in a society in which women are traditionally married soon after menarche and in which sexual relations among unmarried people are not socially acceptable. The new law was accompanied by a marriage boom: the total first-marriage rate for women rose from .922 in 1979 to 1.137 in 1980, 1.303 in 1981, and 1.314 in the first half of 1982; mean age at first marriage fell from 23.1 in 1979 to 22.7 in the first half of 1982. The departure of recent cohorts from standard curves of age at marriage may be the result, then, of government action that artificially reduced rates of first marriage at early ages and led to artificially high rates at later ages, when the pressure was off. The relaxation of pressure against marriages at ages under 23 led to a marriage boom. The effects of these marriage patterns on fertility are explored in the next chapter.

CHAPTER 4

CHILDBEARING IN CHINA SINCE 1950

TOTAL FERTILITY RATES

The published report on the 1/1,000-sample survey of fertility in 1982 includes data on age-specific fertility rates by single years of age from 1950 through 1981. The published tables also include single-year rates for the rural and urban populations for these years and a separately tabulated set of rates for the total population extending back to 1940. The detailed fertility histories were obtained by interviewing women aged 15-67. Because of the upper age limit, the age-specific fertility rates presented for women aged 49 are derived from actual responses of the women interviewed only for years after 1964, rates for women aged 45 are derived from responses only after 1959, etc. The upper age limit of the women interviewed also means that all rates above age 25 in 1940 were estimated by methods not explicitly described.

As noted above, comparison of the annual number of births thus calculated with the annual number from official sources indicates that the official number of births is understated. The comparison also shows systematically lower ratios of official numbers of births to calculated numbers of births for years that have 13 lunar months. It is thus clear that the number of births reported in the fertility survey in those years was too high. Table 5 shows birth rates and total fertility rates (TFRs) based on the estimated annual number of births calculated from the fertility rates reported from the survey. Also shown in Table 5 are birth rates and TFRs adjusted for overstatement of births in years with 13 lunar months and for understatement in other years. If all births were reported by the lunar calendar, 13-month years would have 1.05 times the number of births

TABLE 5 Birth Rate and Total Fertility Rate Derived from Fertility Survey: China

	Unadjusted		Adjusted[a]	
Year	Birth Rate (per 1,000)	TFR	Birth Rate (per 1,000)	TFR
1950	46.5	5.81	41.3	5.93
1951	39.8	5.70	40.6	5.82
1952	45.1	6.47	43.7	6.26
1953	42.2	6.05	43.1	6.17
1954	43.5	6.28	44.4	6.41
1955	42.7	6.26	41.3	6.06
1956	39.4	5.85	40.2	5.97
1957	42.5	6.41	41.1	6.21
1958	36.9	5.68	37.7	5.80
1959	27.7	4.30	28.3	4.39
1960	26.0	4.02	25.2	3.89
1961	21.9	3.29	22.3	3.36
1962	40.1	6.02	40.9	6.14
1963	48.9	7.50	47.3	7.26
1964	39.9	6.18	40.7	6.31
1965	38.9	6.08	39.7	6.20
1966	39.6	6.26	38.3	6.06
1967	33.4	5.31	34.1	5.42
1968	40.4	6.45	39.1	6.24
1969	35.8	5.72	36.5	5.84
1970	36.5	5.81	37.2	5.93
1971	34.6	5.44	33.5	5.27
1972	31.8	4.98	32.4	5.08
1973	29.5	4.54	30.1	4.63
1974	28.0	4.17	27.1	4.04
1975	24.8	3.57	25.3	3.64
1976	23.2	3.24	22.5	3.14
1977	21.1	2.84	21.5	2.90
1978	20.8	2.72	21.2	2.78
1979	21.6	2.75	20.9	2.66
1980	18.1	2.24	18.5	2.29
1981	21.2	2.63	(21.2)	(2.63)
1982	21.3	2.66	(21.3)	(2.66)

[a] Adjusted to correct for effect of lunar calendar and for understatement in other years.

in a solar calendar year, and 12-month years would have .97 times the number in a solar year. The adjusted birth rates and TFRs are calculated on the assumption that two-thirds of the reported births are based on lunar years: leap-year (13-months) rates were divided by 1.033 and non-leap-year (12-months) rates by 0.98.

The unadjusted total fertility rates in Table 5 are taken directly from the report on the fertility survey, which also contains partially estimated TFRs for 1940-49, with an average value of 5.44 for that decade. This rate differs very little from the total fertility rate of 5.50 estimated by Barclay and others (1976) for the Chinese farm population in 1929-31. The total fertility rate from the survey rises to about 6.0 through the 1950s until 1958, when a dramatic decline begins. An increase in fertility from 5.5 to 6.0 as part of the first impact of modernizing forces is not unusual. It frequently occurs because of the diminished effect of various customs and practices that restrict fertility below its potential maximum in almost every less-developed country. These customs and practices, which do not vary according to the number of children already born and hence are not intended to impose a direct limit on the size of the family, include prolonged breastfeeding, periodic separation of spouses because of seasonal migration, prohibition of intercourse during lactation, etc.[7]

The most striking features of the sequence of TFRs are the dramatic reduction from 1956 to 1961 (the TFR in 1961 is only a little more than half of the TFR in 1957); the recovery in 1962 to a TFR similar to the 1950s; and the unique, very high TFR of 7.5 in 1963. The TFR in the mid-to-late 1960s was comparable to the mid-1950s except for a temporary drop in 1967, coinciding with the Cultural Revolution. A sustained decline began after 1970, reaching a low in 1980 that was more than 60 percent below the level in 1970; there was a modest recovery in 1981, but only to a fertility level still well below half the level in 1970. These episodes of a large reduction, an extraordinary recovery, and a subsequent major decline are analyzed further below.

THE EFFECT OF CHANGES IN NUPTIALITY ON THE RATE OF CHILDBEARING

Changes in age at marriage have a different effect on fertility in populations in which married couples practice little contraception and therefore have similar age-specific marital fertility rates whatever the age at marriage and in populations in which married couples effectively control fertility and attain fixed targets of completed size of family. In noncontracepting populations, increases in age at marriage reduce the number of children born to each cohort of women by reducing the number of younger women exposed to the risk of childbearing. The reduced number of younger women who are currently married causes lower fertility in each time period as well as for each cohort. In populations practicing effective contraception, changes in age at marriage alter the timing of births for each cohort of women without necessarily altering the final average size of family achieved. A postponement of childbearing caused by later marriage produces a temporary reduction in period fertility even if cohort total fertility is not changed. When age at marriage stops increasing, this temporary depression of fertility ends.

The effect of increasing age at marriage on fertility even when each cohort achieves the same family size is not generally noticed nor well understood. Imagine, for example, that all women marry at the mean age of marriage and bear only one child, one year after marriage. Suppose that for a long period the age at marriage is 22 years and that both the total first-marriage rate and the total fertility rate are 1.0. Then suppose that at a certain moment the mean age at marriage rises to 23 years. In the year following this shift, there would be no marriages because the cohort that was 22 in the preceding year would all have already married and the cohort becoming 22 in the given year would not marry until reaching 23 a year later. In the ensuing year there would be no births for a similar reason. So from a one-year increase in age at marriage (and age at childbearing) there would be a loss of a full year's quota of marriages and a full year's quota of births even though the proportion ever marrying and the completed family size for every cohort remained fixed. In a more complex change of the sort that actually occurs, a rise in the mean age at marriage within a period of time means that one year's quota of marriages is lost, not in a single year, but during a span of several years. A rise by one year in the mean age of childbearing also means the loss, over a span of years, of one year's quota of births, even though completed size of family of cohorts does not change.

The effect of changes in age at marriage on changes in the total fertility rate can be evaluated under two quite different assumptions about the fertility of the married women when age at marriage is changing. One assumption is that the fertility of married women at each age remains constant as age of entry into marriage changes. This assumption is logically tenable if there is very little contraceptive practice. The second assumption is that the fertility of married women at each duration of marriage remains fixed, with a duration-specific fertility schedule that declines quite steeply because each marriage cohort is curtailing its childbearing after the early attainment of desired family size.

The change in fertility associated with changing nuptiality in China can be estimated under both of these assumptions. First the effect of changes in age at marriage on total fertility is determined when the schedule of age-specific marital fertility is fixed. The proportion of ever-married women at each age in selected years is combined with the age-specific fertility of the ever-married women in 1956. The age pattern of marital fertility in the 1950s (see below) differs little from the age pattern characteristic of populations that do not deliberately control fertility (do not try to reduce childbearing when desired family size has been reached) by contraception or abortion. The first calculation shows the reduction in the total fertility rate that would have occurred if the virtual absence of contraception and abortion of the 1950s had continued (and if there had been no change in factors, such as duration and intensity of breastfeeding, that affect marital fertility in the absence of contraception). The data provided in the report of the 1982 fertility survey are the basis for this calculation. The proportion of ever-married women at each age in each year since 1950 is estimated by the cumulation of first-marriage rates for each cohort (see Table A-4).[8] Division of the tabulated overall age-specific fertility rate at a given age by the proportion ever married at that age yields an age-specific fertility rate of ever-married women. The next step is to multiply the proportion of ever-married women at each age in different years by the age-specific ever-married fertility rates of 1956. The results are shown in Table 6. The total fertility rate would have fallen by a little more than 20 percent from 1950 to 1980 and then risen by several percent to 1982 if the ever-married fertility rates of 1956 had been in effect. Most of the decline in

TABLE 6 Total Fertility Rate Calculated for Selected Years, from Proportion of Women Ever Married and Age-Specific Marital Fertility Rates, 1956: China

	Year							
	1950	1955	1960	1965	1970	1975	1980	1982
Calculated TRF	5.97	5.87	5.68	5.62	5.42	4.96	4.71	4.88
TFR of 1950=100	100	98.3	95.1	94.1	90.8	83.1	78.9	81.7

total fertility rate would have occurred after 1970, when the greater part of the rise in age at marriage occurred. The TFR in 1980 was 61 percent lower than the TFR in 1950; the decline that would have occurred from changes in marriage alone, with constant marital fertility rates, is thus about one-third of the actual decline.

The second calculation of the effects of changing nuptiality is limited to the years after 1970, when the change in nuptiality was greatest and when there was a major increase in the deliberate restriction of marital fertility by contraception and abortion. The rationale of this calculation is different from the first. Duration-specific marital fertility rates have been calculated for 1970, 1977, and 1981 from data in the 1982 fertility survey that give the number of births to women at marriage durations of 0-1, 1-2, . . ., 19-20, and 20+ years in those 3 years and from estimates of the number of ever-married women classified by duration of marriage (Song et al., 1983). The number of women by age in each year have been determined by intracohort interpolation: multiplication by the proportion ever married provides the number of ever-married women by age, and the distribution of the ever-married at each age by duration can then be ascertained from the sequence of first-marriage rates in the cohort for earlier years and younger ages. (The estimated number of ever-married women by duration of marriage from 1970 to 1982 is shown in Table A-5.) The ratio of births by duration since first marriage to number of ever-married women by duration provides a set of duration-specific ever-married fertility rates for 1970, 1977, and 1981 (see Table A-6). The next step is to assume that the married women in each year from 1970 on were subject to 1981 duration-specific fertility rates. This assumption is based on the hypothesis that women during the 1970s were as effective in limiting marital fertility at every stage of marriage as were women at the corresponding stage of marriage in 1981. Such a hypothesis is acceptable (even as an hypothesis) only when it incorporates a schedule of duration-specific fertility that falls off rapidly after relatively high values at early durations, because only then would it be possible for duration-specific fertility to remain unchanged when mean age at marriage increases. When fertility is little controlled (as in 1956) women marrying at age 25 might have about the same fertility at each duration during the first 10 years of marriage as women marrying at 21, but not in the 20th year, when reduced capacity for reproduction would cause lower fertility among those who had married at 25.

In short, the calculation of the births that would have occurred from 1970 to 1981 with the duration-specific fertility rates of 1981 illustrates the change in total fertility rate that would have resulted from changes in age at marriage, even if each cohort had maintained lifetime fertility approximately constant but had shifted the time of childbearing by marrying later. Table 7 shows the results. There were almost 30 million births in 1970; with 1981 duration-specific fertility there would have been only about 16 million. The TFR in 1970 would have been only 3.09 with 1981 duration-specific rates; it was 5.81. Had the rates remained unchanged at the low level, the TFR would have declined from 3.09 in 1970 to a low of 2.41 in 1979 and then risen to 2.85 in 1981. With no change in duration-specific fertility rates (and therefore approximately constant cohort total fertility), there would have been a decline to only 78 percent of the 1970 TFR in 1979 and then a recovery to 92 percent in 1982.

The two calculations--with constant age-specific fertility rates (as of 1956) and constant duration-specific rates (as of 1981)--illustrate different sorts of influence that changes in age at marriage can have on overall fertility. The first calculation shows that had there been no increased use of contraception (and no change in "natural" fertility from reduced breastfeeding), the TFR would have fallen by about 20 percent from 1950 to 1980 because rising age at marriage would have reduced the average exposure to married life and the attendant risk of childbearing. The second calculation shows that even with fixed, highly controlled marital fertility in

TABLE 7 Annual Births (in millions), Total Fertility Rate, 1970-82: China

Year	Actual Number of Births (in millions)	Births with 1981 Duration-Specific Fertility (in millions)	Actual Total Fertility Rate (per 1,000 women)	Total Fertility Rate with 1981 Duration-Specific Fertility (per 1,000 women)
1970	29.84	15.87	5.81	3.09
1971	28.94	16.30	5.44	3.06
1972	27.38	16.32	4.98	2.97
1973	26.05	16.30	4.54	2.84
1974	25.18	16.31	4.17	2.70
1975	22.64	16.41	3.57	2.59
1976	21.58	16.69	3.24	2.50
1977	19.93	17.15	2.84	2.44
1978	19.93	17.67	2.72	2.41
1979	20.93	18.32	2.75	2.41
1980	17.73	19.39	2.24	2.45
1981	21.03	21.03	2.63	2.63
1982	21.56[a]	23.13	2.66[a]	2.85

Note: Actual numbers and rates; hypothetical numbers and rates resulting from duration-specific fertility of 1981.

[a] Estimated.

which childbearing beyond the early durations of marriage is severely limited, the TFR would have declined by about 20 percent from 1970 to 1979 because rising age at marriage during these years would have reduced the number of married women at early durations. Recall that the total first-marriage rate was low during most of the 1970s (as low as 0.64) despite the continuation of universal entry into marriage cohort by cohort. The increase in mean age at marriage that was the principal source of low total marriage rates also produced a reduced number of women in the early durations of marriage. The cessation and slight reversal of the increase in age at marriage, plus the marriage boom associated with the new marriage law of 1980, produced a phenomenal increase in the total marriage rate and a commensurate increase in the number of marriages of short duration. A consequence is that a rise in overall fertility by 18 percent (from a TFR of 2.41 in 1979 to one of 2.85 in 1982) would have occurred with constant fertility by duration of marriage.

The report of the 1982 fertility survey does not provide a time series of age-specific rates of fertility by order of birth, but it does show such rates for 1980 and 1981. The total first-birth rate (the sum over all childbearing ages of age-specific rates of bearing a first child) rose from 0.869 in 1980 to 1.162 in 1981--nearly three-fourths of the increase in the total fertility rate. (Of the increase in the TFR, 90 percent is in the total first-birth rate plus the total second-birth rate, both increases largely the result of compression in 1981 of first and second births by women at different ages into the same time period because of the marriage boom and the reduction in age at marriage.) Some increase in fertility would occur with constant duration-specific fertility even if age at marriage merely stopped rising. If the continued increase in age at marriage had ceased and not reversed, the total first- marriage rate would have returned to about 1.0; the persistent shortage in the annual number of first marriages caused by rising mean age at marriage would have ended.

AGE PATTERNS OF MARITAL FERTILITY

One of the benefits of the detailed information that appears in the report of the 1982 fertility survey is the feasibility of calculating age-specific marital fertility schedules. To do so, the proportion of ever-married women by age is determined from the data on first marriages; a fertility schedule of the ever-married women is then obtained by dividing the overall fertility of women at each age by the proportion ever married. Finally, the marital fertility schedule is derived by a further division of the ever-married rate at each age by the estimated proportion of currently married to ever-married women. This last proportion can be estimated as having approximately the same values in different calendar years because of the surprisingly little difference between it in 1982 and in the Chinese farm population in 1930. The proprortion of currently married to ever-married women at the two dates are as follows:

	Age				
Year	20-24	25-29	30-34	35-39	40-44
1982	.986	.977	.960	.933	.888
1929-31	.981	.968	.953	.916	.860

The very slight difference in these ratios despite the very substantial difference in mortality implies that the higher incidence of widowhood at the earlier date must have been offset by a high rate of remarriage of widows. Approximate age-specific marital fertility schedules by single years of age from 20 through 39 have been calculated for selected years. In every year the ratio of currently married to ever-married women was assumed equal to the average of the ratios for 1929-31 and 1982.

In Figure 13, marital fertility rates are shown relative to a schedule of "natural" fertility, with the ratio to natural fertility at ages 20-24 set equal to 1.00. The comparison with natural fertility provides indirect evidence of the extent to which marital fertility is affected by deliberate control through the use of contraception and abortion. Louis Henry (1961) was the first to note that the age pattern of marital fertility was similar in different populations in which couples do not practice contraception or take other measures to reduce fertility after a certain family size is reached; he called such fertility "natural." In

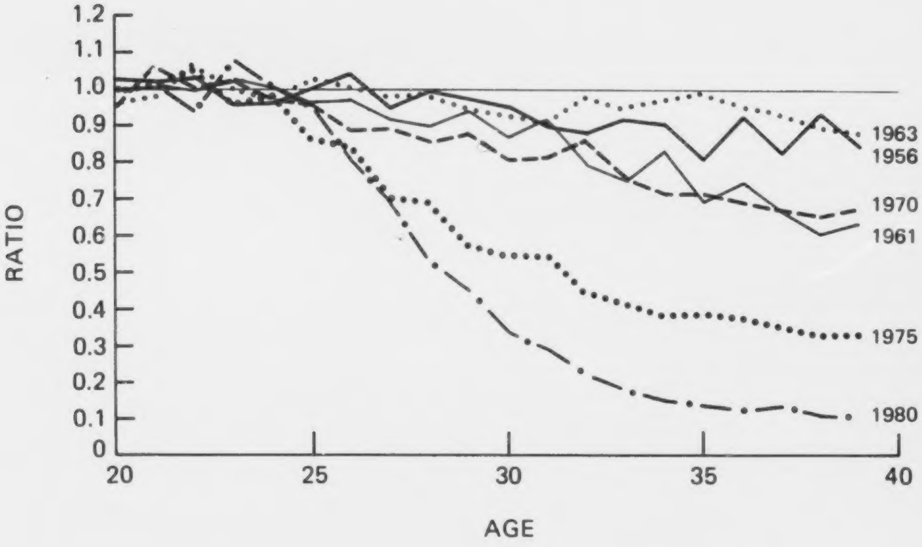


FIGURE 13 Ratio of Age-Specific Marital Fertility to Natural Fertility (with ratio at 20-24 set at 1.00), 1956, 1961, 1970, 1975, and 1980: China

Figure 13, the calculated marital fertility rates are divided by a set of natural fertility rates, with the two schedules--a schedule for China and an average of natural fertility schedules selected for good quality of data from those cited by Henry (Coale and Trussell, 1974)--brought to the same average at ages 20-24. In 1956 the ratio of marital fertility to natural fertility remains above 0.9 except for two points that are probably the result of sampling variation or slightly inexact reporting by respondents who were over age 60 in 1982. In 1961 the TFR was only 56 percent of the TFR in 1956; the reduction in marital fertility was large at younger ages (a 34 percent reduction at 20-24) as well as at older ages (a 49 percent reduction at 35-39). To achieve the modestly increased departure as age increases from the low level of natural fertility schedule in 1961 would entail only a modest use of deliberate limitation by older women.

Low fertility among young as well as older married women in 1961 is consistent with restriction of childbearing caused not only by contraception but by social disruption and the famine conditions in 1960. As noted below, a very high peak in the death rate occurred in 1960, the result of a famine associated with crop failures induced by a combination of chaotic economic conditions, drought, and floods. Famine is known to prevent ovulation and to reduce male libido. Disruption of normal family life while the population was mobilized for various projects and engaged in searches for food, like the direct effects of famine on reproductive capacity, would cause fertility to fall at all ages. The death-rate peak in 1960 implies that 1960 was the worst of the crisis; reduced conceptions in 1960 would produce a very low TFR in 1961. The slightly steeper reduction in marital fertility relative to natural fertility as age increases in 1961 compared with 1956 may have been caused by the greater susceptability of older women to fertility impairment during a famine. A further indication of a quasi-biological basis for the very low marital fertility in 1961 is the height of the peak in fertility reached in 1963. The TFR of 7.50 in 1963 is well above the highest TFR during the 1950s (6.41 in 1957). The age structure of marital fertility in 1963 is very similar to 1956, but at a much higher level. The 1963/1956 ratio of marital fertility rates by five-year intervals for women aged 20-24 to 35-39 varies only from 1.33 to 1.38. The 1963/1961 ratio of marital fertility rates increases from 2.06 at 20-24 to 2.70 at 35-39, possibly because of the cessation of whatever slight degree of contraceptive practice there may have been in 1960-61 or possibly because the catastrophic situation in 1960-61 impaired the fertility of older women more than the fertility of younger women. Marital fertility that is at least one-third higher in 1963 than in 1956 at every five-year age interval from 20 to 40 implies a much higher than normal susceptability to pregnancy. The source of such above-normal susceptability was doubtless an abnormally low proportion of women who had recently given birth (who experience many months without ovulation if they breastfeed) and also an abnormally high number of newlyweds (the total first-marriage rate in 1962 was 1.19).

In sum, the very low fertility of 1961 was probably caused by the disruption of normal married life and by famine-induced subfecundity; the unequaled high fertility of 1963 resulted from the restoration of normal marital life, from an abnormally large number of marriages, and from the unusually small fraction of married women who were infertile because of nursing a recently born infant. The age structure of marital fertility was essentially that of natural fertility, unaffected by deliberate restriction, in 1956 and again in 1963. At the low point in 1961, marital fertility fell with age slightly more steeply than does natural fertility. This pattern may have resulted either from some practice of folk methods of contraception or abortion or from a greater biological effect of the crisis on older women. In 1970 the decline of marital fertility with age relative to natural fertility closely paralleled the corresponding curve for 1961 (see Figure 13 above); but in 1970 this decline was almost certainly the result of an increase in deliberate control with age and not to the biological factors that may have affected older women disproportionately in 1960-61. In 1975 the steep fall of fertility relative to natural fertility clearly shows the much greater effect of fertility restriction among older women; by 1980 the decline in marital fertility with age is comparable to the structure of marital fertility in highly developed societies with total fertility rates below replacement levels.

DIFFERENTIAL FERTILITY

Urban/Rural Differences

The 1982 sample fertility survey provides annual data on fertility and nuptiality in the detail already described for the rural and urban populations as well as for the total. The TFRs for the rural and urban populations are given in Table 8 and shown graphically in Figure 14. In the early 1950s average overall urban fertility increased relative to rural fertility from about 80 to about 90 percent, and it remained at a constant ratio of about 90 percent until 1959 and 1960; evidently, rural fertility was more affected by the Great Leap Forward than was urban fertility. From 1960 to 1966 the ratio of rural to urban TFR fell to about 50 percent, and since then the ratio has been nearly constant. In absolute terms, rural fertility in 1964 returned (after the crisis deficit and the postcrisis peak) to about the level of the 1950s, while urban fertility barely surpassed its 1957 level even in 1963, fell steeply for a few years after 1963, recovered somewhat in 1968, and then fell at the same relative rate as did rural fertility. The decline of urban fertility from 90 percent of rural fertility in the late 1950s to about 50 percent in the late 1960s (while rural fertility remained little changed) appears to

TABLE 8 Total Fertility Rates, Rural and Urban Populations, 1950-81: China

	Total Fertility Rate		
Year	Rural	Urban	Urban/Rural
1950	5.963	5.001	.839
1951	5.904	4.719	.799
1952	6.667	5.521	.828
1953	6.183	5.402	.874
1954	6.390	5.732	.897
1955	6.391	5.665	.886
1956	5.974	5.333	.893
1957	6.504	5.943	.914
1958	5.775	5.253	.910
1959	4.323	4.172	.965
1960	3.996	4.057	1.015
1961	3.349	2.982	.890
1962	6.303	4.789	.760
1963	7.784	6.207	.797
1964	6.567	4.395	.669
1965	6.597	3.749	.568
1966	6.958	3.104	.446
1967	5.847	2.905	.497
1968	7.025	3.872	.551
1969	6.263	3.299	.527
1970	6.379	3.267	.512
1971	6.011	2.882	.479
1972	5.503	2.637	.479
1973	5.008	2.387	.477
1974	4.642	1.982	.427
1975	3.951	1.782	.451
1976	3.582	1.608	.449
1977	3.116	1.574	.505
1978	2.968	1.551	.523
1979	3.045	1.373	.451
1980	2.480	1.147	.463
1981	2.910	1.390	.478

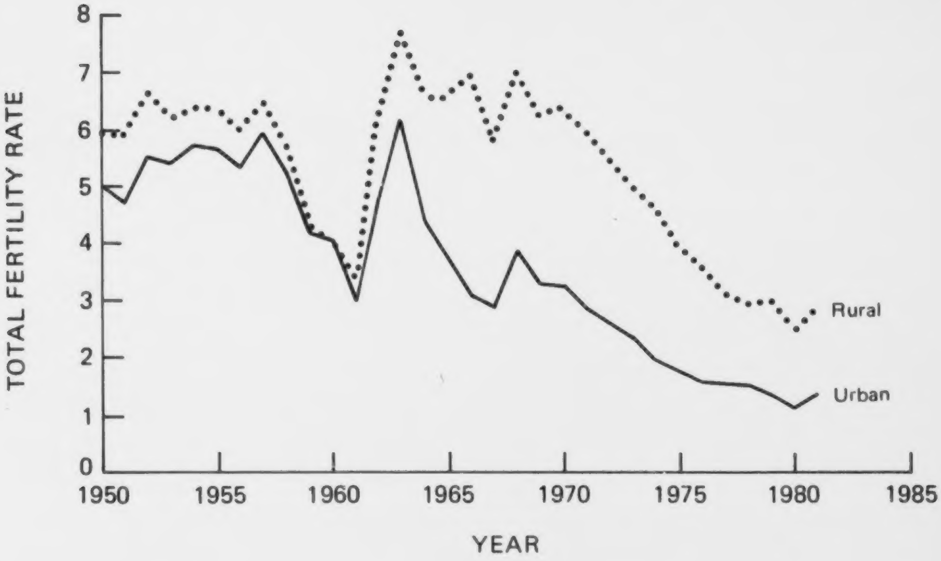


FIGURE 14 Total Fertility Rates, Rural and Urban Populations, 1950-81: China

conform to the classic picture often ascribed to (but not always followed by) European fertility during the so-called demographic transition: the urban population has a higher age at marriage; it starts deliberate family limitation before the rural population does; and after the transition starts in the rural population, the urban population continues to have lower rates of childbearing. The early timing of the urban decline has a simpler explanation, however: the antinatalist program was initiated earlier and pursued more vigorously in the cities.

Age-specific fertility rates of the rural and urban populations in 1955, 1968, and 1980 are compared in Figure 15. In 1955 the difference between rural and urban TFRs is composed almost equally of lower fertility below age 25 in the cities (caused by later marriage) and lower fertility above age 31 in the cities (caused by a modest prevalence of contraception and abortion or possibly by a higher proportion of widows). In 1968, the rural fertility schedule looks much like the schedule in 1955 though slightly higher, except at the younger ages, where slightly later marriage reduced fertility. The early part of the urban schedule in 1968 shows the strong effect of later marriage and the later part the strong

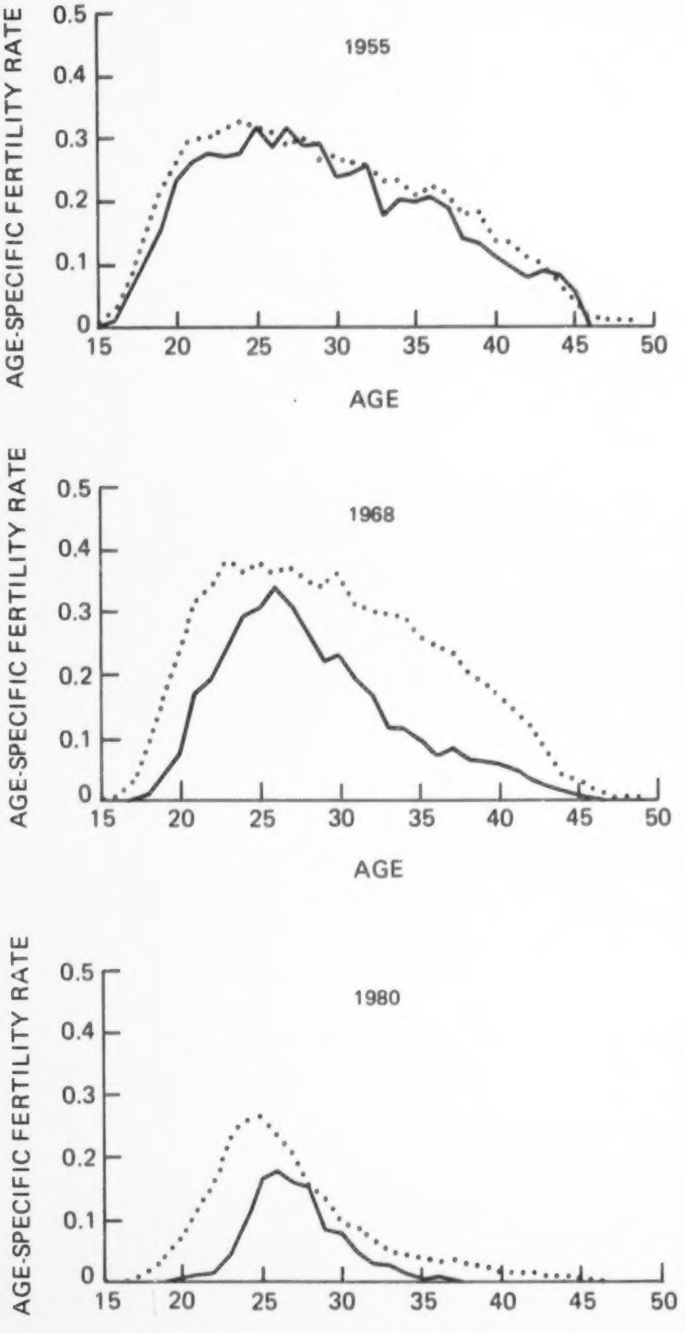


FIGURE 15 Age-Specific Fertility Rates, Rural (dotted line) and Urban (solid line) Populations, 1955, 1968, and 1980: China

effect of deliberate birth control. By 1980 these effects are evident in the rural fertility schedule but are still stronger for the urban schedule.

Han and Minority Group Differences

Another major difference in fertility in China is revealed by data on the childbearing rates of the rural Han population (the dominant Chinese ethnic group) and those of the ethnic minorities, with a total population of some 60 million persons (6 percent of the population). (Li et al., 1983). The minorities have been exempt from most of the pressures of the official antinatalist program, are generally more isolated and less educated, have strong pronatalist traditions, and have much higher fertility. In 1981 the TFR of the minority populations was 5.05 compared with 2.76 for the rural Han. The age-specific fertility schedule of the minorities shows the effect of earlier marriage up to age 25 and less effective control of fertility at higher ages (Figure 16).

Other Fertility Determinants

There are also differences in fertility for women with different levels of education and with differences in occupation. In 1982 the average number of children ever born to women aged 35-49 was 4.74 for illiterate women, 3.81 for women with primary school education, 3.08 for women finishing junior high school, 2.41 for women finishing senior high school, and 1.94 for university-educated women. (These figures, taken from the report of the survey, are subject to the following bias: the women at higher levels of education are more concentrated near age 35 in the 35-49 age interval because of rapid change in education in China; their average parity is lowered by this compositional feature.) At age 50 farmers had an average parity of 5.95, workers of 4.27, and cadres of 3.10 (Li and Zhang, 1983; Zhao and Sun, 1983).

CONTRACEPTIVE PRACTICE IN CHINA

In a chapter entitled "Birth Control of Women of Reproductive Age" in the special issue of Population and Economics (Qui et al., 1983) devoted to the large-scale

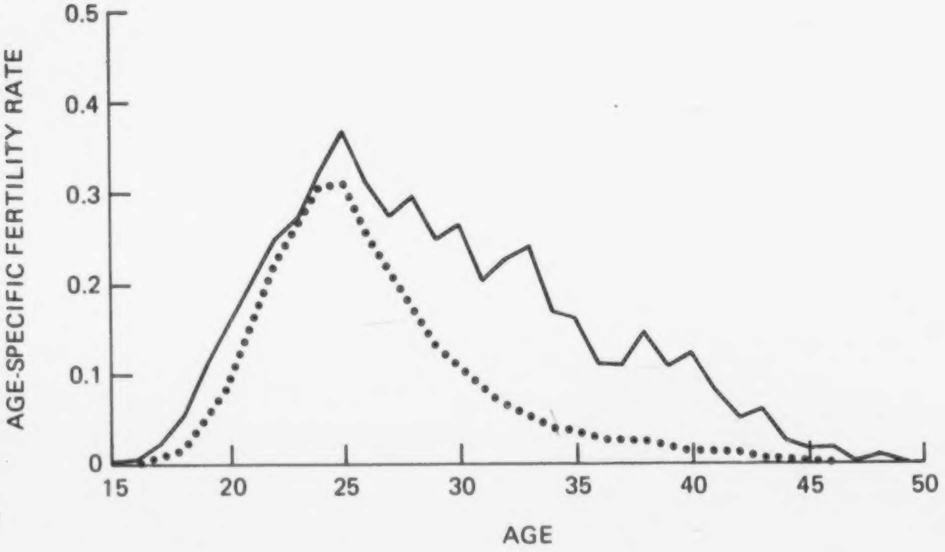


FIGURE 16 Age-Specific Fertility Rates, Ethnic Minority Women (solid line) and Rural Han Women (dotted line), 1981: China

fertility survey, it is reported that 69.5 percent of married women aged 15-49 were practicing contraception in 1982. Of these, 25 percent used female sterilization, 10 percent male sterilization, 50 percent IUDs, 8 percent the pill, and 6 percent condom and other (Qui et al., 1983). The overall rate of use is not very different from Taiwan (65 percent), Hong Kong (72 percent), or Japan (69 percent), but the use of sterilization was more frequent in China than in those neighboring populations (Population Reference Bureau, 1983).

CHAPTER 5

MORTALITY IN CHINA

METHODS

The accuracy of age reporting and the apparent consistency of coverage in the censuses of 1953, 1964, and 1982 makes it possible to construct life tables for each intercensal period, life tables that express the average mortality during the intervals of 1953-64 and 1964-82. Calculation of life tables expressing survival rates and death rates beginning at age zero is possible because the accurate age-specific fertility rates reported from the fertility survey provide the basis for accurate determination of the number of births for each intercensal year.

The construction of life tables is facilitated by a set of relations that are exactly fulfilled in any population that does not gain or lose by migration. The relation relevant to the construction of an intercensal life table is

$$N(x) = N(0)e^{-\int_0^x r(y)dy} (\ell_x/\ell_0) ,$$

where N(x) is the total number of persons who attain exact age x during a specified time period, r(y) is the average rate of increase of persons at age y during the period, and ℓ_x/ℓ_0 is the proportion of persons surviving from birth to age x in a hypothetical cohort subject at each age to the mean death rate at that age in the intercensal period. The mean death rate is defined as the total number of deaths in a given age interval during the time period divided by the total number of person-years-lived in that age interval. This equation can be solved for ℓ_x/ℓ_0, i.e.,

$$\ell_x/\ell_0 = (N(x)/N(0))e^{\int_0^x r(y)dy} .$$

Consequently, to construct a life table it is necessary only to estimate the total number who attain each single year of age x during the intercensal period and to calculate the average growth rates ($_1r_0$, $_1r_1$, $_1r_2$, etc.) of persons at age zero to 1, 1 to 2, etc. during the period. To be precise, these rates are the increase in the number of persons at a given age (say 10-11) divided by the number of person-years-lived at that age. If N(x) is the number attaining age x, the number of person-years-lived from x to x + 1 is approximately (N(x) + N(x+1))/2.

In short, a highly precise life table can be formulated for the period between two censuses if the number attaining each age N(x) can be determined with precision. If the census age distributions recorded in the two censuses are exact and the annual number of births is accurately recorded, N(x) can be accurately calculated. The technique for accurate determination of N(x) is cohort interpolation. For example, it is possible to estimate the number of people who attained exact age 10 of those who were 6-7 in 1953 and 17-18 in 1964 by subtracting a fraction of the total decrease in this cohort during those 11 years. The overall decrease is the number of deaths the cohort experienced between ages 6-7 and ages 17-18; the relevant fraction of the decrease is the proportion of deaths from 6.5 to 17.5 that occur between 6.5 and 10.0. This fraction--an interpolation factor--can be taken roughly as 3.5/11 (on the assumption of an even distribution of deaths) or, more precisely, from a model life table at an approximately appropriate level of mortality.[9]

When the number of people attaining age x has been determined for each cohort that passes through x between the censuses, N(x) is found by taking the total for all such cohorts. The number at age zero is the number of births between the censuses, which is equal to the sum of the number of births calculated for each intercensal year from the number of women at each age from 15 to 49 multiplied by the age-specific fertility rates. Annual births are divided into male and female on the assumption of 106 male births for every 100 female births (51.5 percent male).

LIFE TABLES

The female life tables are more soundly based than the male life tables, because it was necessary to correct the number of males at young adult ages (see above). Abridged life tables for each sex are given in Table 9.

Expectation of life at birth (the mean duration of life or average age at death) according to the average mortality in 1953-64 was 42.2 years for males and 45.6 years for females. In 1964-82 it rose to 61.6 years for males and 63.2 for females. An increase of nearly 20 years in life expectancy in about 15 years is a very rapid increase indeed, even when allowance is made for the high mortality in 1959-61.

Two other data sources from which life tables for China can be calculated were noted earlier, the 1973-75 epidemiological survey and a large-scale survey in 1978. Figure 17 shows female mortality rates at ages 0-1, 1-5, 5-10, 10-15, . . . 80-85 for the two intercensal life tables and the two survey-based sources. The age pattern of mortality is quite similar, and the evolution of mortality rates is in the expected direction. Since the sample data from the 1978 survey were inflated to match exactly the official year-end population and the official figure for the number of deaths, it follows that the death rates derived from the survey are, on average, a little too low.

The 1982 census collected information about deaths in 1981, classified by age and sex, in each household. A life table calculated on the basis of those reported deaths and the 1981 age distribution derived from the 1982 census was presented in March 1984 at the international seminar on the 1982 census held in Beijing (Jiang et al., 1984). According to this life table, there was a further increase in expectation of life at birth to 66.4 years for males and 69.4 years for females.

CRUDE DEATH RATES

The crude death rate from 1953 to 1982 based on the officially recorded number of deaths is shown in Table 10 together with an estimated sequence in which the rates are adjusted for underreporting. The adjustment for each year is based on a crude estimate of the annual proportion underreported, an estimate based on the assumption of rising completeness of recorded deaths until 1964 and

TABLE 9 Abridged Life Tables, Male and Female, 1953-64 and 1964-82: China

	Male			Female		
Age	l(x)	m(x)	e(x)	l(x)	m(x)	e(x)
1953-64						
0	1.00000	0.13789	42.20	1.00000	0.14212	45.58
1	0.87101	0.02354	47.38	0.86731	0.02586	51.47
5	0.79368	0.00630	47.85	0.78315	0.00708	52.85
10	0.76909	0.00384	44.31	0.75592	0.00360	49.67
15	0.75443	0.00498	40.11	0.74243	0.00314	45.52
20	0.73588	0.00680	36.05	0.73087	0.00433	41.20
25	0.71127	0.00849	32.21	0.71521	0.00618	37.04
30	0.68168	0.01010	28.50	0.69344	0.00728	33.12
35	0.64807	0.01415	24.84	0.66863	0.01024	29.26
40	0.60372	0.01880	21.48	0.63521	0.01332	25.66
45	0.54948	0.02373	18.35	0.59427	0.01560	22.25
50	0.48786	0.03133	15.34	0.54964	0.01894	18.86
55	0.41688	0.04424	12.52	0.49989	0.02660	15.48
60	0.33366	0.06446	10.00	0.43737	0.04169	12.32
65	0.24090	0.09186	7.88	0.35446	0.06450	9.59
70	0.15125	0.13100	6.10	0.25580	0.09824	7.31
75	0.07754	0.18663	4.63	0.15518	0.14834	5.44
80	0.02968	0.26500	3.47	0.07246	0.22303	3.96
85	0.00747	0.37475	2.56	0.02271	0.33336	2.82
90+	0.00103	0.53677	1.86	0.00388	0.50614	1.98
1964-82						
0	1.00000	0.05042	61.64	1.00000	0.05467	63.22
1	0.95082	0.00616	63.81	0.94679	0.00700	65.75
5	0.92778	0.00292	61.36	0.92078	0.00334	63.57
10	0.91437	0.00122	57.24	0.90555	0.00120	59.61
15	0.90882	0.00190	52.57	0.90014	0.00167	54.95
20	0.90022	0.00308	48.04	0.89267	0.00229	50.39
25	0.88648	0.00338	43.75	0.88249	0.00267	45.94
30	0.87162	0.00357	39.45	0.87077	0.00315	41.52
35	0.85618	0.00381	35.12	0.85718	0.00374	37.14
40	0.84002	0.00442	30.74	0.84131	0.00435	32.80
45	0.82165	0.00618	26.37	0.82322	0.00572	28.46
50	0.79664	0.01025	22.12	0.79999	0.00864	24.21
55	0.75676	0.01681	18.14	0.76611	0.01319	20.16
60	0.69556	0.02793	14.51	0.71711	0.02165	16.36
65	0.60441	0.04507	11.29	0.64322	0.03542	12.93
70	0.48150	0.07363	8.51	0.53813	0.05755	9.95
75	0.33133	0.11940	6.22	0.40223	0.09216	7.44
80	0.17967	0.19251	4.39	0.25155	0.14698	5.39
85	0.06596	0.30775	3.01	0.11799	0.23294	3.79
90+	0.01279	0.49929	2.00	0.03480	0.38571	2.59

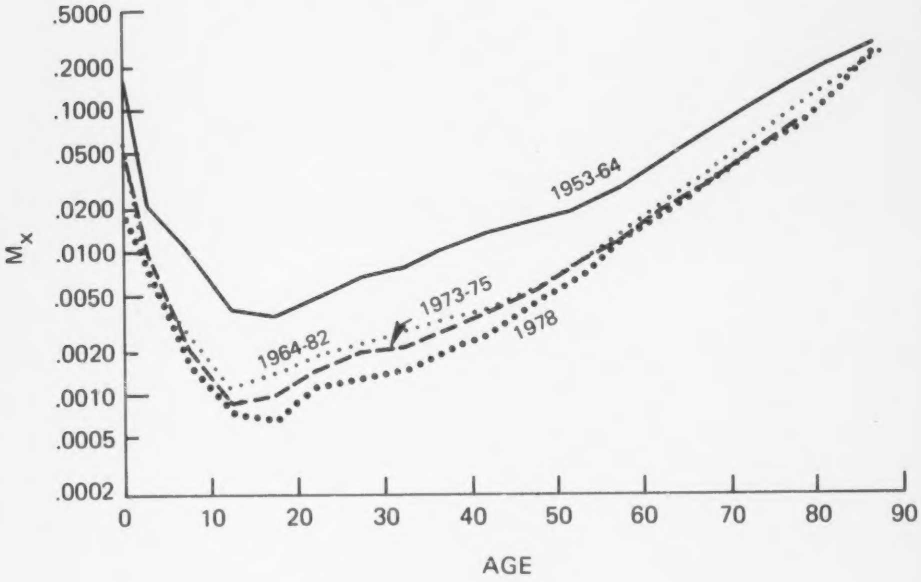


FIGURE 17 Age-Specific Mortality Rates, Females, 1953-64, 1964-82, 1973-75, and 1978: China

constant thereafter. The officially recorded deaths show a large reduction in the crude death rate, interrupted by an increase during the crisis years of 1958-61, with a peak rate of over 25 deaths per 1,000 population in 1960.

Because deaths were much less completely recorded in 1953-64 than in 1964-82, it is clear that the true decline in the death rate was much greater than indicated by the official rates. The crisis years of greatly elevated mortality are within the first intercensal period, when in 11 years an estimated 38 percent of deaths were not recorded, but completeness of recording probably improved and the crisis was near the end of the intercensal interval. In the next interval from 1964 to 1982 only 16 percent of deaths were not recorded. The adjusted deaths given in Table 10 are based on the assumption that about 55 percent of deaths were recorded from 1953 to 1956 and that completeness of recording then rose to 84 percent in 1964, with an average completeness of 62 percent. On this assumption, about 66 percent of deaths were reported in 1960, implying a crude death rate of nearly 39 per 1,000. The number of deaths calculated from the officially listed death rate is 5.90 million in

TABLE 10 Crude Death Rates (per 1,000), 1953-81: China

Year	From Official Sources	Roughly Corrected for Understatement
1953	14.0	25.5
1954	13.18	29.1
1955	12.28	22.4
1956	11.40	20.8
1957	10.80	19.0
1958	11.98	20.4
1959	14.59	23.3
1960	25.43	38.8
1961	14.24	20.5
1962	10.02	13.7
1963	10.04	13.0
1964	11.50	13.5
1965	9.50	11.1
1966	8.83	10.4
1967	8.43	9.9
1968	8.21	9.6
1969	8.03	9.4
1970	7.60	8.9
1971	7.32	8.6
1972	7.61	8.9
1973	7.04	8.3
1974	7.34	8.6
1975	7.32	8.6
1976	7.25	8.5
1977	6.87	8.1
1978	6.25	7.3
1979	6.21	7.3
1980	6.20	7.3
1981	6.19	7.3

1957 and 8.02 million in 1964. Had deaths followed a linear trend from 5.9 million to 8.0 million over these years, the total number of deaths in 1958-63 would have been 41.8 million. The number derived from officially recorded death rates is 57.4 million; by this calculation the crisis led to an excess of about 16 million deaths. The number of deaths in 1957 and 1964 adjusted for underregistration are 10.4 and 9.4 million. With a linear trend, the adjusted total number of deaths in 1958-63 would have been 59.4 million. The actual total (adjusted for estimated underregis- tration) is 86.2 million, an excess above the linear trend of about 27 million deaths. Thus, excess deaths are 16 million with no allowance for underreporting and 27 million with a rough allowance.

VARIATION OVER TIME

A comparison of the number of persons enumerated at each single year of age in 1982 (from 0-1 to 30-31) with the constructed number of births in each year from 1952 to 1982 provides partial additional evidence of the time variation of mortality in China. If the number of births from July 1 to June 30 were known exactly and if the census enumeration had been exact, the ratio of the enumerated population at age x to x + 1 to the number of births from July 1 x years before 1982 to June 30 x + 1 years before 1982 would be a cohort survival rate. (See note 4 for a description of how fiscal year births were estimated.) The sequence of cohort survival rates indicates which cohorts suffered heavy mortality and which suffered relatively light mortality. These survival rates are shown in Table 3 (above), as are the number of births estimated for each fiscal year and the number in the corresponding cohort in 1982. The survival rate is 0.9 or higher for cohorts born in 1968-69 or later, is at its lowest for cohorts born in 1966-67 and 1963-64, and is below 0.8 for all cohorts born before 1961-62 except 1959-60.

These calculated cohort survival rates do not support the natural hypothesis of especially high infant and child mortality in the cohorts born during the crisis years. The survival rate for the birth cohort of 1960-61 is lower than the survival rate of adjacent cohorts, but not as low as the survival rate of the cohorts born in 1958-59 and earlier. The implied proportions surviving to age 5 in these cohorts, given the proportion surviving from 1964 to 1982, are no higher than 75 to 80 percent.

CHAPTER 6

CONCLUSIONS

The welcome flood of accurate demographic data from China provides an unusually detailed depiction of an extraordinary population. Being the most populous nation in the world has not prevented the People's Republic of China from compressing into a short time very big reductions in fertility (more than 50 percent in a decade) and mortality (more than 20 years added to the expectation of life at birth in about 15 years). The earliest data are not inconsistent with the fertility (about the same TFR) and nuptiality (marriage about 1 year later) of traditional China, as reconstructed from a survey around 1930. The latest data are not inconsistent with some of the principal demographic characteristics of developed countries two or three decades ago. The most recent TFR in China is about the same as in the United States or a typical population in Western Europe in the 1960s; the recent average duration of life is not far from that attained in those populations about 30 years ago. Age at marriage has also changed from the very early norms traditional in much of Asia to ages more like those found in the West.

The rapid changes of fertility, mortality, and nuptiality in China have not been without costs (the excess mortality and abnormal reduction with subsequent abnormal recovery in fertility in the "bitter years"). That the surprisingly rapid changes have also incurred grave social costs can be inferred from the recent decision to reduce pressure for late marriage and from the anomalous high male/female ratio of births of second and higher order in 1981. The marriage boom of 1981-82 is not the only obstacle to attaining and maintaining very low fertility. Further upward pressure on the birth rate in the late 1980s is built into the age distribution of

China's population. In contrast to the reduced number of women in their early 20s in 1982 (because of the greatly reduced birth cohorts for 1958-61), during the next few years the much larger birth cohorts of 1963-70 will be in the normal ages of first marriage and soon thereafter in the very fertile years following marriage.

Doubtless there will be surprises, setbacks, and severe social costs among the future developments in the population of China. The changes will be better understood and the basis for policy sounder if the authorities continue to monitor the dynamics of the Chinese population closely and to continue to publish the data they collect. However, a rich lode of useful information is still to be extracted from the censuses and the fertility survey. This report has used only a fraction of the published data from the survey and has hardly touched the information contained in the census. Analysis of the sort attempted here can be extended to a separate treatment of mortality by sex and to the demography of various subgroups--the population of provinces, persons of various social and economic characteristics, etc. Continued analysis of the data already collected will be as valuable as the continued compilation of new data.

NOTES

1. The analyses based on the sample assumes that the survivors, i.e., those in the sample, do not differ in their fertility experience from nonsurvivors. There is much evidence that this assumption is true and that if there are any differences, they are trivial and do not affect the analyses.
2. The life tables are constructed by an extension of a method devised by Preston and Coale (1982). In brief, the construction involves calculating the number of persons who cross each exact age x in the intercensal period, an estimate derived by interpolation between the number enumerated in each cohort in the earlier and later censuses. When the data are accurate, the method yields a life table that is an exact expression of intercensal mortality by age. A full description of the method is contained in Coale (1984).
3. A more precise estimate can be obtained for each single year of age by allowing for the fact that the proportion surviving from one age to another is not an exactly linear sequence. More appropriate, slightly nonlinear interpolation is achieved by deriving interpolation factors from a model life table at about the right level of mortality.
4. The births derived from the age-specific fertility rates are for calendar years (January 1 to December 31); the births compatible with the census age distributions are for "fiscal" years (July 1 to June 30) because the censuses were taken as of midyear. Fiscal-year births were estimated by a division of the calendar year births into first-half-year and second-half-year births. The difference between first-half-year and second-half-year births was taken

as one-fourth the difference between the births in the preceding year and in the following year. These half-year births were then recombined on a fiscal year basis.

5. It should be noted that a "stopping rule"--no more births after a boy is born, but possibly another after the birth of a girl--is well known not to increase the male/female ratio.
6. The age-specific rates for 1981-82 were obtained by assuming the continuation to the first half of 1982 of the 1981 rates.
7. It is also possible that older women understate the number of births that occurred to them a long time ago and that such understatement may contribute to the low estimates of fertility in the 1940s from this survey. However, the rates are in agreement with data about Chinese farmers, and the agreement of the numbers projected from the births in the 1950s to the 1982 census with the single-year distribution in that census is a convincing indication of no substantial understatement of the births reported as occurring nearly 30 years before the survey.
8. For cohorts that began entering marriage before 1950, the proportion ever married at each age was determined by subtracting first-marriage rates from 0.999, assigned to the age above which no more first marriages in the cohort were reported.
9. This method of life table construction is fully described in an article by Ansley Coale (1984). Constructed examples with artificially perfect data show that the life table is exact if the data used are exact.

APPENDIX: DATA TABLES

TABLE A-1 Calculated Number of Women by Single Years of Age, Aged 15-49 for Each Year, Estimated by Cohort Interpolation (in 100s), 1953-82: China

	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
15	46697	47411	47988	50748	52425	49695	51587	53509	59019	62470	62466	64154	73837	73341	85660
16	47587	46763	47383	47854	50500	52289	49498	51430	53450	58868	62129	62033	63662	73793	73238
17	49647	47586	46835	47353	47712	50235	52144	49288	51261	53386	58706	61764	61517	63625	73745
18	55327	49551	47584	46912	47320	47557	49948	51986	49060	51079	53318	58531	61230	61436	63583
19	50876	54656	49448	47582	46994	47285	47393	49642	51819	48817	50886	53245	57932	61128	61349
20	49963	50619	53962	49342	47581	47079	47249	47223	49325	51645	48565	50685	52739	52742	61022
21	45019	49654	50359	53257	49235	47579	47165	47212	47050	49004	51469	48310	50229	52610	57546
22	46048	44817	49335	50090	52530	49124	47577	47254	47174	46872	48673	51288	47849	50131	52476
23	44052	45754	44610	49008	49814	51784	49010	47576	47345	47135	46689	48333	50752	47728	50029
24	44278	43913	45454	44398	48674	49532	51021	48893	47574	47438	47096	46502	47923	50576	47603
25	44912	44012	43772	45146	44182	48331	49243	50241	48774	47572	47534	47055	46060	47856	50394
26	40440	44637	43741	43627	44833	43961	47983	48949	49446	48652	47570	47631	46584	45945	47787
27	40363	40184	44359	43466	43481	44515	43737	47629	48651	48639	48529	47568	47158	46446	45828
28	42435	40137	39926	44078	43189	43333	44195	43511	47273	48350	47826	48405	47119	47023	46307
29	40897	42154	39908	39666	43795	42909	43184	43872	43284	46913	48047	47005	47940	47007	46886
30	39448	40657	41868	39677	39402	43507	42626	43032	43544	43052	46548	47739	46553	47817	46892
31	37181	38975	40414	41579	39442	39135	43216	42338	42879	43212	42819	46178	47269	46434	47692
32	37927	36887	38495	40168	41286	39204	38864	42920	42047	42724	42875	42581	45767	47136	46313
33	37328	37553	36589	38008	39918	40988	38963	38589	42621	41751	42566	42533	42193	45683	47001
34	35729	37015	37174	36288	37516	39665	40688	38719	38311	42318	41453	42407	42043	42106	45598
35	36216	35320	36699	36792	35983	37019	39410	40384	38472	38030	42012	41151	42002	41852	42017
36	36202	35696	34907	36380	36407	35676	36518	39152	40078	38224	37747	41704	40689	41896	41656
37	35358	35713	35172	34491	36059	36019	35368	36013	38894	39770	37974	37462	41239	40519	41788
38	35012	34942	35223	34647	34075	35737	35630	35058	35508	38634	39461	37723	37049	41069	40345
39	34793	34546	34525	34731	34120	33656	35414	35240	34747	35000	38373	39151	37278	36901	40895
40	33476	34422	34073	34102	34232	33586	33232	35087	34844	34432	34486	38109	38677	37098	36749
41	29732	32873	34048	33597	33675	33730	33047	32805	34757	34445	34114	33967	37651	38477	36913
42	29789	29351	32273	33675	33123	33250	33229	32511	32379	34428	34048	33798	33568	37461	38274
43	30348	29364	28973	31678	33306	32653	32830	32733	31980	31958	34102	33655	33437	33409	37270
44	30877	30003	28938	28596	31084	32937	32184	32409	32238	31449	31537	33777	33236	33314	33247
45	29540	30486	29654	28507	28213	30482	32563	31708	31983	31736	30912	31110	33344	33050	33188
46	28572	29076	30085	29296	28066	27822	29865	32181	31221	31547	31222	30361	30682	33145	32858
47	29040	28139	28603	29676	28931	27616	27423	29236	31790	30724	31102	30697	29941	30469	32937
48	28495	28648	27695	28118	29257	28557	27155	27013	28592	31391	30215	30646	30282	29728	30246
49	27249	28035	28246	27240	27621	28828	28174	26682	26594	27932	30981	29694	30180	30077	29506

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
15	87613	91777	97288	88489	92821	95379	70057	69230	54513	78660	139047	125138	118625	124626	110395
16	85605	87483	91693	97151	88383	92684	95192	69947	69290	54423	78847	138700	124781	118878	124892
17	73125	85546	87341	91603	97002	88267	92534	94989	69827	69356	54325	79052	138322	124392	119158
18	73692	73001	85481	87184	91503	96837	88139	92369	94765	69695	69428	54217	79278	137904	123963
19	63538	73634	72867	85411	87015	91395	96659	88001	92190	94523	69552	69506	54101	79523	137453
20	61257	63491	73574	72727	85338	86838	91282	96473	87857	92004	94269	69402	69588	53979	79778
21	60913	61163	63442	73513	72583	85262	86657	91166	96282	87709	91812	94010	69249	69672	53854
22	57344	60800	61065	63392	73449	72434	85184	86468	91045	96084	87555	91614	93740	69089	69759
23	52337	57134	60683	60965	63340	73382	72280	85103	86273	90921	95879	87396	91408	93461	68925
24	49924	52194	56917	60562	60860	63287	73314	72121	85019	86072	90792	95667	87232	91196	93173
25	47474	49815	52047	56694	60437	60753	63232	73244	71956	84933	85864	90660	95449	87063	90977
26	50208	47342	49704	51895	56464	60309	60642	63175	73171	71787	84844	85651	90523	95225	86889
27	47717	50018	47207	49590	51740	56230	60178	60530	63117	73097	71615	84754	85433	90384	94996
28	45711	47646	49826	47070	49476	51584	55994	60047	60416	63058	73023	71441	84663	85213	90244
29	46165	45591	47573	49630	46932	49359	51425	55754	59912	60300	62999	72947	71264	84570	84990
30	46746	46020	45468	47500	49431	46790	49240	51262	55508	59775	60182	62938	72869	71083	84475
31	46775	46603	45871	45343	47424	49226	46645	49118	51096	55257	59635	60061	62876	72790	70898
32	47564	46655	46457	45720	45215	47347	49019	46497	48994	50927	55001	59492	59938	62813	72709
33	46189	47434	46534	46308	45566	45085	47269	48807	46346	48867	50755	54740	59346	59812	62748
34	46863	46063	47301	46409	46157	45408	44952	47189	48590	46192	48738	50578	54473	59198	59684
35	45511	46723	45934	47165	46283	46002	45248	44817	47107	48369	46036	48606	50399	54202	59046
36	41927	45422	46579	45802	47026	46153	45844	45084	44679	47024	48144	45875	48471	50215	53924
37	41458	41835	45332	46433	45668	46886	46022	45683	44918	44538	46939	47915	45713	48334	50029
38	41679	41257	41741	45240	46285	45532	46743	45888	45520	44748	44395	46853	47682	45547	48195
39	40168	41568	41051	41646	45147	46134	45394	46597	45752	45354	44576	44250	46765	47445	45379
40	40717	39986	41453	40840	41548	45050	45979	45252	46447	45612	45183	44399	44100	46675	47201
41	36593	40534	39799	41336	40624	41448	44952	45819	45106	46294	45468	45008	44217	43947	46583
42	36724	36434	40348	39609	41217	40405	41346	44852	45658	44958	46138	45323	44830	44033	43791
43	38069	36534	36273	40160	39418	41097	40182	41243	44751	45494	44808	45980	45175	44650	43846
44	37074	37859	36340	36110	39968	39222	40974	39956	41137	44647	45327	44655	45819	45025	44466
45	33080	36872	37642	36139	35940	39770	39020	40847	39721	41028	44540	45155	44497	45652	44869
46	33056	32905	36661	37417	35930	35764	39563	38809	40715	39477	40915	44429	44975	44332	45479
47	32657	32919	32724	36443	37182	35713	35581	39349	38590	40577	39223	40797	44314	44788	44161
48	32722	32449	32776	32536	36215	36939	35487	35390	39126	38363	40434	38959	40675	44194	44594
49	30014	32496	32231	32627	32339	35977	36684	35251	35191	38892	38125	40285	38684	40547	44068

Note: The number at a given age in a given year was determined by intra-cohort interpolation. For example, women at age 22-23 in 1958 were aged 17-18 in 1953 and aged 28-29 in 1964. The number is estimated as ${}_1N_{17}(53) - f({}_1N_{17}(53) - {}_1N_{28}(64))$ when f is the expected fraction of the total cohort deaths from 1953 to 1964 that occurred while the cohort advanced from 1953 to 1958. This fraction was estimated as $({}_1L_{17} - {}_1L_{22})/({}_1L_{17} - {}_1L_{28})$ from a model life table (West level 9) which is about the proper level of mortality. West levels 15 interpolation factors were used for 1964-82. Note that the use of model life table interpolation factors does not ascribe the given level of mortality to the cohort to which the interpolation is applied. Only the distribution of deaths within each age interval is borrowed from the model table. The survival rate from one census date to the next is taken from the censuses themselves.

TABLE A-2 Population by Sex and Single Years of Age, 1953, 1964, and 1982 (after adjustment): China

Age	Female	Male	Sex Ratio	Age	Female	Male
1953[a]						
0	94001	98588		50	27996	29210
1	108081	114115		51	24582	26036
2	84684	90267		52	24923	25780
3	81241	88242		53	22365	22987
4	69997	76565		54	21082	22153
5	57637	74708		55	21710	23217
6	65575	73358		56	20458	21733
7	60068	67793		57	20193	20554
8	53831	61281		58	21083	20784
9	52301	50364		59	19655	19205
10	50492	58890		60	20899	20121
11	52925	61718		61	17311	16814
12	51531	60585		62	16402	15476
13	48291	57107		63	15876	14683
14	47443	56768		64	15690	14134
15	46697	55514		65	15170	13294
16	47587	55361	1.1634	66	13708	11975
17	49647	57168	1.1515	67	12748	10762
18	55327	63002	1.1387	68	12038	9790
19	50876	58537	1.1506	69	11009	8972
20	49963	57259	1.1460	70	11598	8977
21	45019	51387	1.1415	71	10078	7634
22	46048	52436	1.1387	72	9556	6882
23	44052	50042	1.1360	73	8209	5772
24	44278	50137	1.1323	74	6292	4298
25	44912	50732	1.1296	75	5736	3781
26	40440	45533	1.1259	76	5107	3231
27	40363	45336	1.1232	77	4397	2689
28	42435	47508	1.1195	78	4023	2340
29	40897	45674	1.1168	79	3300	1840
30	39448	43948	1.1141	80	2998	1577
31	37181	41321	1.1113	81	2162	1108
32	37927	42011	1.1077	82	1921	931
33	37328	41246	1.1050	83	1472	682
34	35729	39348	1.1013	84	1139	500
35	36216	39786	1.0986	85	910	387
36	36202	39671	1.0958	86	642	258
37	35358	38617	1.0922	87	461	177
38	35012	36143	1.0894	88	348	127
39	34793	38054		89	215	75
40	33476	36481		90	179	66
41	29732	33085		91	94	30
42	29789	32313		92	67	21
43	30348	32344		93	47	15
44	30877	32718		94	33	11
45	29540	31083		95	29	11
46	28572	30202		96	23	8
47	29040	29985		97	15	5
48	28495	29131		98	13	4
49	27249	28503		99	8	3
				100	17	16

[a] Adjustments for 1953: The male population aged 16-38 was inflated so as to match the estimated sequence of males/females by age, and to add in 6.8 million males (the difference between the population total for the official age distribution and the total listed as "well enumerated"). The whole population was inflated by 582.6/574.2 to allow for the 8.4 million "indirectly enumerated."

TABLE A-2 (continued)

Age	Female	Male	Sex Ratio	Age	Female	Male
1964[b]						
0	140747	145104		50	30559	31140
1	148386	155164		51	26553	26949
2	75983	80256		52	25259	25579
3	56138	59619		53	24641	24356
4	69044	74509		54	26069	24904
5	71768	77587		55	25947	24137
6	97666	107001		56	23658	21733
7	94414	103429		57	23014	20895
8	89702	97725		58	23957	21052
9	98615	107124		59	22462	19679
10	92773	100017		60	21973	19021
11	88714	9531[illegible]		61	20792	17947
12	86440	92580		62	18900	15966
13	74092	80266		63	18500	15363
14	74416	81905		64	15975	12965
15	64154	70996		65	14236	11471
16	62033	69353	1.118	66	14278	11321
17	61764	69299	1.122	67	12912	10117
18	58531	65847	1.125	68	12486	9404
19	53245	60114	1.129	69	11815	8779
20	50685	57375	1.132	70	10768	7657
21	48310	54880	1.136	71	9917	6983
22	51288	58417	1.139	72	8835	5976
23	48333	55245	1.143	73	7569	4985
24	46502	53291	1.146	74	6982	4423
25	47055	54113	1.150	75	6325	3885
26	47631	54919	1.153	76	5555	3253
27	47568	53870		77	4715	2696
28	48405	54442		78	4061	2213
29	47005	52369		79	3309	1730
30	47739	53702		80	2813	1438
31	46178	51530		81	2358	1145
32	42581	47732		82	1934	891
33	42533	47562		83	1550	656
34	42407	46689		84	1186	488
35	41151	45145		85	738	303
36	41704	45607		86	544	212
37	37462	41539		87	414	151
38	37723	41154		88	306	107
39	39151	42480		89	210	73
40	38109	40734		90	151	55
41	33967	36327		91	86	29
42	33798	36130		92	60	21
43	33655	35709		93	42	16
44	33777	35494		94	33	14
45	31110	32329		95	28	14
46	30361	31550		96	22	10
47	30697	32036		97	15	7
48	30646	30949		98	14	7
49	29694	30254		99	11	7
				100	30	21

[b] Adjustments for 1964: The male population aged 16-26 was inflated so as to yield the indicated sequence of sex ratios, which added 2.35 million. The male population at every age was inflated by a factor of 1.0069 and the female by a factor of 1.0071 to allow for 4.9 million persons listed as age unknown.

TABLE A-2 (continued)

Age	Female	Male	Sex Ratio	Age	Female	Male
1982[c]						
0	100280	107820		50	40413	45293
1	83624	90173		51	38092	43421
2	88114	94629		52	39792	44674
3	94924	101313		53	37054	40770
4	90303	95988		54	37547	41452
5	94079	100134		55	33776	37048
6	98949	105211		56	33241	35930
7	105542	112211		57	34133	36435
8	116622	123685		58	33221	34765
9	121718	129165		59	29725	30820
10	122221	129948		60	30388	31222
11	132417	140861		61	28551	29081
12	128559	136396		62	28243	28578
13	137231	145161		63	25142	24594
14	118980	126250		64	24354	23672
15	110395	116975		65	24853	23282
16	124892	134796	1.079	66	23255	21589
17	119158	128607	1.079	67	21606	19912
18	123963	133793	1.079	68	22265	20187
19	137453	148353	1.079	69	18943	16781
20	79778	86104	1.079	70	17427	15101
21	53854	58125	1.079	71	16627	14061
22	69759	75291	1.079	72	16054	13038
23	68925	73977		73	15543	12006
24	93173	101287		74	13449	10184
25	90977	97922		75	12204	8892
26	86889	92329		76	11732	8166
27	94996	101737		77	10935	6873
28	90244	95934		78	9096	5985
29	84990	89893		79	8043	5060
30	84475	89089		80	6944	4235
31	70898	75406		81	5792	3384
32	72709	80061		82	4466	2503
33	62748	68850		83	3407	1843
34	59684	65659		84	2960	1532
35	59046	65083		85	2341	1188
36	53924	59015		86	1839	853
37	50029	55607		87	1440	638
38	48195	54214		88	1054	453
39	45379	51542		89	774	307
40	47201	53288		90	618	248
41	46583	53332		91	384	137
42	43791	49871		92	277	99
43	43846	50021		93	184	60
44	44466	51412		94	117	44
45	44869	51047		95	98	37
46	45479	51050		96	57	23
47	44161	48790		97	40	18
48	44594	49955		98	31	15
49	44068	49628		99	22	11
				100	27	11

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[c] Adjustments for 1982: The number of female members of the armed forces were allocated as follows: 20 percent to age 19; 60 percent to age 20; and 20 percent to age 21. The number of males at each age from 16-22 was estimated as 1.079 times the number of females at the same age, adding 4.1 million males and 0.1 million females, totaling the listed 4.2 million military personnel.

TABLE A-3 Proportion of Children Born Alive Who Were Born in Specified Years, by Age of Mother, 1982: China

	Age of Mother							
Year of Birth	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
81-82	.681	.398	.144	.030	.009	.003	.001	.000
80-81	.219	.254	.146	.036	.010	.004	.001	.000
79-80	.066	.152	.141	.050	.014	.005	.001	.000
78-79	.027	.093	.132	.066	.020	.008	.002	.000
77-78	.007	.052	.109	.074	.025	.010	.004	.001
76-77		.028	.093	.083	.032	.015	.006	.001
75-76		.014	.077	.090	.042	.020	.009	.002
74-75		.005	.062	.095	.053	.026	.013	.004
73-74		.002	.044	.096	.064	.035	.018	.006
72-73		.001	.027	.090	.072	.043	.024	.010
71-72			.016	.083	.079	.050	.031	.014
70-71			.007	.073	.084	.058	.036	.019
69-70			.003	.055	.085	.061	.040	.024
68-69			.001	.039	.086	.068	.045	.029
67-68				.022	.077	.068	.046	.031
66-67				.012	.067	.067	.047	.034
65-66				.006	.060	.071	.052	.040
64-65				.002	.049	.070	.054	.041
63-64				.001	.039	.075	.061	.049
62-63					.023	.072	.065	.052
61-62					.008	.046	.047	.037
60-61					.003	.030	.037	.030
59-60					.001	.026	.040	.035
58-59					.001	.025	.046	.043
57-58						.022	.054	.051
56-57						.013	.052	.053
55-56						.007	.046	.052
54-55						.003	.041	.054
53-54						.001	.032	.052
52-53							.023	.052
51-52							.014	.047
50-51							.007	.041
Before 1950							.004	.063

TABLE A-4 Proportion of Ever-Married Women (per 1,000 women) by Single Years of Age, Aged 15-35, Constructed from First Marriage Rates, 1950-81, and Reported in the Sample Survey, 1981: China

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
15	65	74	54	40	35	32	31	29	28	25	23	23	24	24	19	14	12
16	219	211	192	158	137	125	118	113	107	98	90	89	95	92	79	64	50
17	412	375	360	337	307	281	261	253	246	225	206	205	215	222	195	160	136
18	574	565	533	518	495	475	451	426	418	394	362	358	377	392	369	314	270
19	694	704	693	672	652	636	629	604	573	552	528	512	538	561	543	497	434
20	795	799	803	794	777	756	746	747	718	675	661	658	666	694	687	647	603
21	861	867	869	870	861	849	830	823	825	790	754	760	775	783	790	763	724
22	905	907	911	915	912	906	897	878	872	873	843	821	844	858	849	848	819
23	931	934	937	942	944	940	936	931	913	905	909	890	880	901	903	890	890
24	950	952	954	956	961	963	960	958	952	934	929	941	929	919	935	931	918
25	967	967	968	969	971	975	976	974	971	965	949	949	965	954	941	954	952
26	977	978	977	977	978	980	984	985	982	980	975	961	964	979	966	954	970
27	983	984	984	983	983	985	987	990	990	988	986	982	970	972	987	974	963
28	987	986	988	988	987	988	989	991	993	993	991	991	988	975	977	991	978
29	991	990	990	991	992	990	991	992	993	995	995	994	994	991	978	979	993
30	993	993	992	992	994	993	992	993	993	995	996	996	995	996	993	981	981
31	994	994	994	994	994	995	995	994	994	994	996	998	998	997	997	994	982
32	995	995	995	995	995	995	996	995	995	995	995	997	998	998	997	997	995
33	997	996	996	997	996	996	996	997	996	995	996	996	998	999	998	998	998
34	997	998	997	997	997	997	997	997	997	996	996	997	997	998	999	999	998
35	997	998	998	998	998	998	998	997	997	997	997	997	997	998	998	999	999

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
15	10	10	9	8	8	6	5	5	5	4	3	3	2	2	2	2
16	42	42	41	36	31	26	20	17	17	14	12	11	9	9	10	8
17	116	109	110	100	84	71	58	45	39	36	30	28	26	24	26	24
18	249	231	225	218	188	157	134	109	89	76	69	61	59	61	60	60
19	401	390	374	361	337	292	245	207	173	144	127	117	108	115	128	121
20	553	538	540	513	480	445	389	332	286	246	213	194	184	186	226	261
21	696	670	674	669	617	572	537	480	421	375	333	301	290	295	329	384
22	790	785	776	775	755	696	651	622	570	518	478	441	419	427	463	508
23	869	855	862	849	840	818	759	723	705	668	625	593	572	569	612	668
24	924	914	909	915	895	884	866	814	790	789	762	727	716	719	739	793
25	942	955	951	943	946	924	917	906	861	848	860	841	821	835	852	879
26	969	961	977	971	960	962	944	942	936	899	895	913	903	899	921	927
27	981	981	973	987	979	969	974	958	960	960	926	925	949	947	945	960
28	969	988	988	979	992	984	976	981	966	973	975	942	944	971	969	979
29	981	973	993	992	981	995	988	980	985	972	979	984	954	956	982	985
30	995	983	975	995	993	983	997	990	982	988	974	984	990	961	962	988
31	982	996	985	976	995	995	985	998	992	984	990	977	987	994	965	991
32	983	983	997	985	976	996	996	986	999	993	986	991	978	989	996	990
33	996	983	984	997	985	977	996	996	986	999	993	986	992	979	990	995
34	999	996	983	984	997	985	977	997	997	986	999	993	987	993	980	995
35	999	999	996	983	984	997	986	977	997	997	987	1000	994	988	994	996

Note: The first marriage rate given for the earliest age (15) in a given year is approximately equal to the proportion ever married at exact age 16 at the end of the year. Addition of the first-marriage rate at 16 in the next year yields the proportion ever married at exact age 17 at the end of that year. For a given year (say 1970) and a given single-year age interval (say, 20 to 21), there are four relevant calculable proportions of ever-married women: at exact ages 20 and 21 at the beginning and end of the year. The proportion ever married at 20 to 21 in mid-1970 is taken as the arithmetic mean of these four numbers.

TABLE A-5 Number of Ever-Married Women (in 100s) by Duration Since First Marriage, 1970-82: China

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
0	63774	57380	54166	53399	53596	56004	60271	63828	67433	74804	87422	101710	115044
1	64462	63653	57273	54065	53292	53487	55883	60136	63679	67163	74659	87257	101529
2	56053	64329	63531	57159	53955	53182	53371	55760	59996	63425	67036	74512	87088
3	46590	55929	64193	63400	57042	53845	53068	53249	55633	59759	63301	66903	74362
4	41157	46476	55801	64052	63268	56925	53732	52949	53128	55415	59639	63173	66766
5	41271	41047	46365	55671	63911	63131	56804	53613	52827	52920	55308	59524	63044
6	47509	41152	40937	46247	55541	63764	62995	56680	53493	52623	52819	55199	59402
7	55878	47357	41030	40823	46126	55405	63615	62852	56548	53288	52523	52715	55086
8	54014	55698	47205	40903	40708	46006	55268	63462	62706	56333	53187	52422	52610
9	45300	53836	55514	47052	40775	40587	45883	55126	63305	62461	56227	53087	52318
10	38747	45186	53624	55326	46895	40646	40470	45794	54982	63014	62343	56121	52983
11	38230	38623	45035	53409	55135	46736	40514	40389	45665	54718	62884	62220	56010
12	41338	38109	38494	44854	53222	54941	46607	40383	40261	45432	54595	62752	62093
13	42024	41237	37981	38336	44699	53031	54744	46443	40242	40038	45316	54469	62613
14	41703	41920	41099	37863	38207	44538	52839	54510	46271	40007	39924	45204	54341
15	40837	41568	41778	40970	37773	38069	44342	52649	54264	45991	39882	39852	45048
16	40353	40703	41427	41614	40867	37673	37895	44189	52368	53936	45875	39757	39743
17	40503	40218	40560	41261	41507	40718	37537	37772	43942	52055	53748	45759	39634
18	40846	40371	40078	40403	41117	41389	40570	37418	37550	43635	51868	53594	45605
19	42855	40745	40229	39894	40300	40996	41202	40445	37197	37320	43478	51731	53371
20+	426534	434765	440660	446463	448001	449403	453142	456971	456900	453781	449152	452197	461760

Note: Calculated from first marriage frequencies at each age for each cohort, the proportion ever married (Table A-4) and the number of women (Table A-1).

TABLE A-6 Number of Births and Marital Fertility Rate at Each Duration of Marriage, 1970, 1977, and 1981: China

	Number of Births			Duration-Specific Fertility		
	1970	1977	1981	1970	1977	1981
0	513	833	1730	.08087	.13084	.17009
1	3152	3243	5705	.49156	.54068	.65382
2	2265	1892	2562	.40623	.34018	.34384
3	1826	1723	2051	.39401	.32440	.30656
4	1545	1525	1597	.37735	.28875	.25280
5	1302	1450	1302	.31711	.27113	.21874
6	1372	1252	1046	.29030	.22144	.18950
7	1600	1234	809	.28783	.19682	.15347
8	1741	1082	729	.32401	.17091	.13906
9	1326	904	609	.29424	.16438	.11472
10	1198	687	488	.31080	.15038	.08695
11	914	542	479	.24030	.13452	.07698
12	1087	461	376	.26432	.11443	.05992
13	976	414	311	.23344	.08936	.05710
14	1024	391	270	.24680	.07190	.05973
15	900	403	187	.22152	.07672	.04692
16	873	313	170	.21747	.07100	.04276
17	793	314	148	.19679	.08333	.03234
18	767	217	138	.18874	.05813	.02575
19	685	218	142	.16067	.05403	.02745
20+	3436	899	493	.08099	.01972	.01090

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